EPA/ROD/R08-95/095
1995

EPA Superfund
Record of Decision:

SUMMITVILLE MINE
EPA ID: COD983778432
OU 00
RIO GRANDE COUNTY, CO
12/15/1994

INTERIM RECORD OF DECISION
for
WATER TREATMENT

Summitville Mine Superfund Site
Summitville, Colorado

DECLARATION FOR RECORD OF DECISION

Site Name and Location

Summitville Mine Superfund Site, Summitville, Rio Grande County, Colorado.

Statement of Basis and Purpose

This decision document presents the selected interim remedial action for point source water treatment at the Summitville Mine Superfund Site (Site) in Summitville, Colorado chosen in accordance with the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), 42 U.S.C. § 9601 et seq., as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA) and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP)(40 CFR Part 300).

This decision is based on the administrative record for this Site.

The State of Colorado Department of Public Health and the Environment (CDPHE) concurs with the selected interim remedial action.

Assessment of the Site

Interim remedial actions are appropriate "to protect human health and the environment from an imminent threat in the short term, while a final remedial solution is being developed." ("Guide to Developing Superfund No Action, Interim Action and Contingency Remedy RODs," EPA. OSWER Publication 9355.3-02FS-3, April 1991). Actual or threatened releases of hazardous substances from this Site, if not addressed by implementing the interim remedial action selected in this interim Record of Decision (IROD), may present imminent and substantial endangerment of public health, welfare, or the environment.

Description of Selected Remedy

This interim remedy addresses the treatment of acid mine drainage (AMD) and water containing cyanide from the Summitville Site. The water originates from sources altered or disturbed during mining activities at the Site. The selected alternative is feasible, implementable and cost effective in reducing or eliminating transport of acidity, dissolved metals, and metal/cyanide complexes in the surface and ground water at the Site.

This interim remedial action is anticipated to produce continued reduction of contaminated water flows to the Alamosa Watershed. The results of the interim remedial action will be routinely monitored to determine the additional actions needed at each portion of the Site to achieve the final, sitewide remediation goals.

The major components of the selected interim remedy are listed below.

- Continued treatment of the French Drain waters in the Cropsy Water Treatment Plant (CWTP);
- Destruction of cyanide in the water from the Heap Leach Pad (HLP) will continue in the Cyanide Destruction Plant (CDP)/Metals Reduction Plant (MRP) until the water quality meets remedial action objectives;
- Completion of HLP remediation, followed by the conversion of the CDP to treat Acid Mine Drainage (AMD). The MKP would be closed and would remain on-Site as a contingency facility; and
- Containment of AMD during peak surface water flows that exceed CDP capacity (500 gallons per minute). The contained water would be treated before being released into Wightman Fork during Interim Remedial Action.

This interim remedy is consistent with current or future activities to complete sitewide remediation goals.

No changes have been made to the preferred alternative originally presented in the Water Treatment Proposed Plan. However, the sequence of numbering the alternatives in the IROD varies from that of the Water Treatment FFS because some of the Water Treatment FFS alternatives were not retained after the screening process. Therefore, Alternatives 2 through 5 of the IROD correspond to Alternatives 3 through 6 of the Water Treatment FFS, respectively.

Statutory Declarations

This interim remedial action is protective of human health and the environment, complies with Federal and State applicable or relevant and appropriate requirements (ARARs) for this interim limited-scope action, and is cost effective. Although this interim action is not intended to address fully the statutory mandate for permanence and treatment to the maximum extent practicable, this interim action does utilize treatment and thus is in furtherance of that statutory mandate. Because this action does not constitute the final remedy for the Site, the statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume as a principal element, although partially addressed in this remedy, will be addressed in the final response action. Subsequent actions are planned to fully address the threats posed by the conditions at this Site. Because this remedy will result in hazardous substances remaining on-site above health-based levels, a review will be conducted to ensure that the interim remedy continues to provide adequate protection of human health and the environment within five years after commencement of the remedial action. Because this is an interim ROD, review of this Site and of this remedy will be ongoing as the EPA continues to develop final remedial alternatives for the Site.

William P. Yellowtail   December 15, 1994
Regional Administrator
U.S. Environmental Protection Agency, Region VIII

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

1.0 DECISION SUMMARY

1.1 Site Location and Description

The Summitville Mine Superfund Site is located about 25 miles south of Del Notre, Colorado, in Rio Grande County (Figure 1). It is located within the San Juan Mountain Range of the Rocky Mountains, approximately two miles east of the Continental Divide, at an average altitude of 11,500 feet. The 1,231 acre mine permitted area is positioned on the northeastern flank of South Mountain. The disturbed area at the Site covers approximately 550 acres (Figure 2). On the north, this area is bounded by the deserted town of Summitville, and by Wightman Fork Creek. It is bounded by Cropsy Creek to the east, and the peak of South Mountain to the southwest. The Site is located in the Rio Grande Drainage Basin near the headwaters of the Alamosa River. Two tributaries drain the Site - Wightman Fork Creek and Cropsy Creek. The confluence of Cropsy Creek and Wightman Fork is located on the northeastern perimeter downstream of the Site. Wightman Fork Creek drains into the Alamosa River approximately 4.5 miles below the Cropsy Creek confluence.

1.1.1 Climate

The climate in the area where the Site is located is characterized by long cold winters and short cool summers. Winter snowfall is heavy and thunderstorms are common in the summer (SRK, 1984). Temperatures range from a high of 70°F and a low of 17° F in the summer to a high of 40°F and a low of-25°F in the winter. The Site receives an average of 55 inches of precipitation annually, mostly in the form of snowfall, with annual evaporation at approximately 24 inches (Remedial Measures Plan, 1992).

There is a relatively snow-free period of 5-6 months from May through October. This time period is regarded as the "construction season." Site access and operations during the rest of the year requires a significant amount of snow removal. Continued water treatment and flow, or meticulous winterization, is required to prevent water from freeing in the pipes.

1.1.2 Topography

Approximately 550 acres of the Site is comprised of heavily altered terrain due to mining operations. The Site's pre-1870 topography consisted of upland surfaces, wetlands, and South Mountain peak. The predominant Site ground cover was alpine tundra at the higher elevations with coniferous forest and subalpine meadow in the lower elevations. The mountains which surround the Site, including Cropsy Mountain to the south, are between 12,300 feet and 12,700 feet in elevation.

The Wightman Fork drainage covers approximately 3.0 square miles upstream from the Wightman Fork diversion. The catchmerit elevations range from 11,225 feet to 12,754 feet. The Cropsy Creek drainage area entails 0.85 square miles on the northeast slopes of the Cropsy Mountain and the southern slopes of South Mountain. Elevations within this drainage range from 12,578 feet down to 11,200 feet at the Cropsy Creek confluence with Wightman Fork (Klohn Leonhoff, 1984). Wight Fork drains into the Alamosa River approximately 4.5 miles from the Cropsy Creek confluence.

Disruption of the topography began, on a limited scale, in 1870 with placer gold mining in stream- formed alluvial deposits. This placer mining was followed by open cut mining on gold-bearing quartz veins. Underground mining followed. As mining production depths increased, several processing mills were constructed to handle the increased capacity and produce a concentrate suitable for transit. This initial mining phase lasted through 1890. Additional underground mining occurred from 1925 to 1940 and resulted in surface deposition of waste rock near the adit entrances. Additionally, piles of mill tailings were placed downgradient from the stamp mills and the 1934 flotation-cyanidation mill.

Further surface disruption of the topography resulted from work in the late 1960's when Wightman Fork was diverted north to allow construction of a dam and tailings pond. With this new impoundment, mill tailings were put on the Beaver Mud Dump (BMD), and water was impounded above the dam in the Summitville Dam Impoundment (SDI) (previously called the Cleveland Cliffs Tailings Pond by Environmental Protection Agency).

The most dramatic surface alterations started in 1984 with the construction of the mine pits and dumps by Summitville Consolidated Mining Company, Inc. (SCMCI) to support its open pit heap leach gold mine operations. The main topographical feature is the highwall of South Mountain. This highwall is fractured and has a one to one (horizontal to vertical) slope.

1.1.3 Geology

Summitville is located near the margin of the Platoro-Summitville caldera complex. Rocks in the mine area consist of South Mountain. Quartz Latite Porphyry. The porphyry is underlain by the Summitville Andesite. The contact between the latite and andesite is intrusive, faulted in some areas and is nearly vertical. On the north side, the contact is fault-bounded by the Missionary Fault. South Mountain is bounded on the southwest by a large northwest-southeast trending regional fault called the South Mountain Fault. The South Mountain Quartz Latite Porphyry is bounded to the west, on both sides of the South Mountain Fault, by slightly older Park Creek Rhyodacite. It is overlain at higher elevations by erosional remnants of slightly younger Cropsy Mountain Rhyolite (Stoffegen, 1987). Figure 3 shows a geologic section of the Cropsy Valley.

South Mountain volcanic dome emplacement, alteration, and mineralization occurred in rapid sequence approximately 22.5 million years ago (Rye, et. al., 1990). Magmatic, surfate-laden water expulsed from the quartz latite magmas was hot and highly acidic ($pH \leq 2$, temperature of 250° C - Stoffregen, 1987), and caused extensive alteration to the quartz latite. Alteration occurs in four sequential zones: the massive vuggy silica zone, the quartz-alunite zone, the quartz-kaolinite zone, and the clay alteration zone. The massive vuggy silica zone is often a highly porous zone in which all major elements but silica and iron were leached by acidic solutions and replaced in places by excess silica. This zone occurs in irregular pipes and lenticular pods, and generally shows greater vertical than lateral continuity (Stoffregen, 1990). The next outwardly occurring zone is the quartz-alunite zone, in which feldspars of the quartz latite porphryry were replaced by alunite. This zone grades outward to a thin quartz-kaolinite zone, which is not always present, and then into an illite-montmorillonite -chlorite zone in which feldspar and biotite grains were replaced by illitc and quartz, with lesser kaolinite and montmofillonite. The quartz-alunite and clay alteration zones are the most volumetrically significant. Fine-grained pyrite is disseminated through the groundmass in all zones (Stoffregen, 1987).

Summitville mineralization is an example of epithermal Au-Ag-Cu mineralization associated with advanced argillic alteration. Mixed magmatic and surface water (derived from snowmelt and rainfall), less acidic and more reducing than the magmatic water that produced the alteration zones, deposited metals and metallic sulfides at shallow (<1 km) depths (Rye, et al., 1990). Mineralization is associated mostly with the porous vuggy silica zone, and occurs as covellite + luzonite + native gold changing with depth to corellite + tennanite. Gold also occurs in a near-surface barite + goethite + jarosite assemblage that crosscuts the vuggy silica zone (Stoffregen, 1987).

Post-volcanic geologic processes have been largely erosional. The two major streams that drain the Site, Cropsy Creek and Wightman Fork, tend to follow the quartz latite/andesite contact. Numerous springs and seeps occur at this junction between the fractured quartz latite porphyry aquifer and the underlying dense andesite aquitard.

Site cover material consists of topsoil, silt, clays, and gravel. The topsoil is described as grey/brown/orange, non-plastic with a trace of roots and sand. Clays are of low to medium plasticity with some gravel.

1.1.4 Hydrogeology

Ground water at the Site is present as a series of intermittent, shallow, perched aquifers. Shallow ground water occurs in surficial deposits consisting of colluvium, "slope wash" alluvium and/or glacial ground moraine; and weathered parts of the Summitville Andesite. These shallow systems eventually discharge to surface water. The upper perched aquifer system also contributes to the ground water recharge of the fractured bedrock system. Numerous springs and seeps cover the entire Mine site, the greatest number at the locus of the distal edge of the dome. Most of the springs and seeps flow in direct response to precipitation, with high and low flows corresponding to high and low flow of the surface water system in the area.

A natural surface water drainage system exists along the southern portion of the Summitville Site. The surface water drainage system includes Cropsy Creek and Wightman Fork. Extensive re-working of both drainage systems has been conducted.

1.1.5 Present Surrounding Land Use and Populations

The Site is surrounded by National Forest Service land (Rio Grande National Forest). The multiple-use designation of this land gives it a high level of desirability for snow mobiling, cross country skiing, hiking, camping, horseback riding and picnicking. Additionally, logging activity is on-going adjacent to Park Creek Road and other roads adjacent to the Site. During the summer months, domestic cattle and sheep graze in the surrounding area and during the winter months, the surrounding area is heavily used for hunting.

The distance to the nearest off-site building is 2.1 miles to the east (EPA, 1992). The water from the Site flows past the town of Jasper into Terrace Reservoir, both of which are recreational areas. Private residences and a Phillips University Camp use water from wells adjacent to the Alamosa River. Below the Terrace Reservoir, the river flows past the town of Capulin which contains two municipal wells and many domestic wells. Throughout this drainage area, homes, farmsteads and ranches depend upon alluvial wells or river water for potable or agricultural water production. However, recent EPA analysis indicates that the Site has not impacted alluvial drinking water supply wells (Morrison Knudsen, 1994). Additionally, water from the Alamosa River is used within the Monte Vista Wildlife Refuge and in the La Jara Creek system through the Empire Canal (District Court, Rio Grande Co.,1992).

1.2 Site History and Enforcement Activities

1.2.1 Site History

Placer gold was discovered in Wightman Gulch in the summer of 1870 (Guiteras, 1938). The lode deposit was found near the headwaters in 1873, and by 1875 open cut workings had been established. The ore consisted of native gold in vein quartz, reportedly associated with limonite and other ion oxides, which comprised the surficial, oxidized zone of the deposit. Became this zone reportedly extended to 450 feet below the surface, adits and shafts had to be driven into the veins (Garrey, 1933). There was only minor production in the mine area from 1890 to 1925.

In 1897, the Reynolds Adit was driven into the Tewksbury vein, located below the central portion of the contemporary Summitville pit. The Adit was completed in 1906 (Knight Piesold, 1993). Reports of acidic water exiting the adit soon followed (Garrey, 1933).

A significant gold find occurred in 1926 when high grade ore was struck. From 1926 to 1931, 864 tons of ore was extracted. The Reynolds Adit was rehabilitated to provide haulage and development access. Plans were made to connect the Reynolds to the Iowa Adit, 540 vertical feet above the Reynolds. This connection was completed in 1938. Iowa ores were then dropped down to the Reynolds level for haulage. The Reynolds and the Iowa Adits also provided drainage for the main workings (Knight Piesold, 1993).

In 1934, a 100 ton-per-day flotation/cyanidation mill and gold retort was installed close to the south bank of the original Wightman Fork Creek. Records indicate that dewatering filtrate from the flotation circuit was discharged directly into Wightman Fork throughout the mid-1930's.

In 1941, three tunnels were in operation: the Iowa, Narrow Gauge, and Reynolds. During World War II, the government mandated the termination of mining of non-essential minerals to focus on essential minerals needed for the war effort. Gold production ceased.

From 1943 to 1945, a high grade copper vein found in the Narrow Gauge and Reynolds was developed. By 1944, only the Narrow Gauge Tunnel was operating. In 1947, the Reynolds was again rehabilitated. Approximately 4,000 feet of rail needed replacement due to deterioration from acidic water. By 1949, the water flow discharge from the Reynolds ranged from 100-200 gallons per minute (gpm) (Stevens, T.A., 1960).

From 1950 to 1984, the Minesite was the target of several exploration and underground rehabilitation programs. Production of copper, gold, and silver was sporadic. An extensive drilling program was conducted by Tonto Drilling Services for ASARCO in the late 1970's and early 1980's to delineate a potentially rainable gold deposit (Knight Piesold, 1993).

The underground and surface operations during the original discovery of gold to the early 1980's resulted in surface deposition of waste rock near adit entrances and deposition of mill tailings downgradient of the original mill. An attempt to process ore to extract copper content in the late 1960's and early 1970's resulted in a diversion of Wightman Fork from its original route to further north of the existing tailings, construction of the SDI (1969) and deposition of mill tailings east of existing tailings piles.

During recent operations (1984-1991), Summitville Consolidated Mining Company Incorporated (SCMCI), a wholly-owned subsidiary of Galactic Resources; Inc., developed the remaining mineral reserves as a large tonnage open pit heap leach gold mine. Gold containing ore (9.7 million tons) was mined, crushed and heaped onto a constructed clay-and-synthetic-lined pad. A solution containing 0.1-0.5% sodium cyanide was applied to crushed ore on the Heap Leach pad (HLP) and was allowed to percolate through the ore to leach out gold. The solution was then pumped from the ore and gold was removed from the leachate with activated carbon. The leaching solution was rejuvenated by restoring the target cyanide level and recycled through the heap. Gold was stripped from the carbon, precipitated from the stripping solution, smelted to make dore metal, and sold.

The Summitville HLP is a "valley fill" design. This design differs from more widely employed designs in that it is more of a lined depression, or rock filled pond, than a lined leaching "pad". Utilization of a valley fill design usually results from topographic limitations that make construction of a free draining pad difficult. The process solution was pumped directly from the HLP to the gold recovery plant. The more common leach pad design enables water percolated through ore to constantly drain to a "pregnant solution pond" outside of the HLP, rather than being held in the same containment area as the crushed ore. The design of the HLP as a continuous water containment structure prevents the natural drainage of water from the cyanide bearing pad and complicates the closure of the ore pile.

The HLP containment feature was constructed in a portion of the valley occupied by Cropsy Creek. Cropsy Creek was moved to allow construction of the HLP. After diversion of Cropsy Creek, a portion of the valley was enclosed by dikes. The area between the dikes was contoured and lined and became the HLP.

Open pit mining operations conducted by SCMCI did not expose standing ground water in the mine pit. Infiltration of surface water (derived from snowmelt and rainfall) through the pit may have resulted in elevated dissolved metal concentration in the water draining from the Reynolds Adit. This trend is observed when compared to the available pre-open pit drainage data.

During the SCMCI operation, topsoil was stripped and placed into stockpiles. Other overburden and waste material was used for road and dike construction, placed into the Cropsy Waste Dump, placed in the North Pit Waste Dump; and placed over the historic mill tailings to form the Beaver Mud Dump. Difficulties in processing some of the ore resulted in formation of the Clay Ore Stockpile, near the present solution pumphouse location, and an in-pit stockpile. Figure 2 illustrates these areas.

The last ore tonnage was placed on the HLP in October 1991. Addition of sodium cyanide to the ore continued until March 1992. After mining operations were concluded, SCMCI proceeded toward Site cleanup and closure by converting the gold recovery plant to a cyanide destruction facility for HLP detoxification, converting the existing alkaline chlorination water treatment plant to a sulfide precipitation process, and by installing a treatment plant to process Reynolds Adit drainage.

1.2.2 Enforcement Activities

In February of 1991, after monitoring rising concentrations of cadmium, copper, zinc and cyanide in Wightman Fork, the State of Colorado cited violations of water quality legislation and issued a Cease and Desist Order to SCMCI (Holm, 1991).

On December 3, 1992, SCMCI declared bankruptcy and announced that financial support of Site operations would not continue beyond December 15, 1992. On December 16, 1992 the EPA Region VIII Emergency Response Branch, as a part of an Emergency Response Removal Action (ERRA), began treating cyanide-contaminated leachate from the HLP and AMD from three significant sources: the French Drain Sump, the Cropsy Waste Pile, and the Reynolds Adit (Ecology and Environment, 1993).

Site operation oversight was undertaken by the United States Bureau of Reclamation (USBR) under an inter-agency agreement with the EPA. In December 1992, Environmental Chemical Corporation (ECC), under the direction of the USBR, began conducting engineering evaluations of the water treatment processes and subsequently began improvements to water treatment processes and facilities.

The Site was added to the Superfund National Priorities List CNPL) on May 31, 1994.

<u>1.3 Community Participation</u>

The Proposed Plan for the Summitville Mine Site was released to the public in August 1994. The Proposed Plan, the Focused Feasibility Study, and other documents in the Administrative Record are available at information repositories at the following locations: Del Norte Public Library located in Del Nolte, Colorado; the Conejos County Agricultural and Soil Conservation Service located in La Jara, Colorado; and the EPA Superfund Records Center located in Denver, Colorado.

Public meetings were held in Alamosa, Colorado to present the Proposed Plans and to take public comment. The comment period was extended 30 days to October 23, 1994.

Highlights of community participation are summarized as follows:

- When EPA took over the Site in December 1992, there was a great deal of public interest, mostly from farmers downstream of the Site who were concerned that their irrigation water would be contaminated. As EPA worked to reduce the chance for a large toxic spill and began more water treatment at the Site, the farming community became satisfied that there was no imminent danger of contaminating their water supply. Since that time there has been a decreed interest about the Site from the general public. The interest in the Site nationally has been very high due to the media using Summitville as a "red flag" for the need for mining reform.

- In June 1993, a Superfund informational workshop was provided to the public in La Jara, Colorado.

- On August 2, 1993, a public meeting was held in Alamosa, Colorado describing alternatives for reducing acid mine drainage from the Cropsy Waste Pile, the BMD, Cleveland Cliffs Tailings Pond (now referred to as Summitville Dam Impoundment), and the Mine Pits. An Engineering Evaluation/Cost Assessment (EE/CA) fact sheet was published. Public comment was taken until September 3, 1993.

- The Community Relations Plan for Summitville was written and distributed in September, 1993. The Community Relations Plan provides a guide for EPA's community involvement program based on interviews with local citizens.

- A Technical Assistance Grant (TAG) was awarded for the Site in February 1994. This group is now well organized and has hired several consultants. The TAG Group has been active in the area in an attempt to generate interest in the Site. They have published regular Summitville columns in the Valley Courier newspaper and have held informational meetings.

- EPA held a briefing for Congressional aides in May 1994.

- Press releases have been written dealing with the following:
    - Proposal to place on the National Priorities List (NPL),
    - Listing on the NPL,
    - Announcing meetings,
    - Availability of materials,
    - Comment periods,
    - Availability of work through bid process,
    - Bid awards, and
    - Status of work at the Site.

- Five Site Status Updates have been written and distributed to over 200 interested parties as well as a year end report for 1993.

- Articles about the mine were written by local newspaper writers and appeared at least weekly for the past year. Files of these newspaper articles are available in the Community Relations office and will be placed in the information repositories.

- In December 1993, the EPA produced and distributed copies of videos of the Summitville Minesite. One hundred fifty copies have been circulated to schools, officials and interested community members. The video gives an overview of the contamination at the Site, a brief history of the Site; and a "video tour".

1.4 Scope and Role of Interim Remedial Action within Site Strategy

The original mine permitted area includes 1,231 acres; the area referred to as the Site is comprised of approximately 550 acres of land disturbed by historic as well as recent mining activities. The most common type of contamination associated with production of a metal mine such as Summitville is the formation and discharge of large volumes of acidic water. The acid generation can occur either chemically or biologically; as part of the living processes of certain microorganisms. The acid is formed chemically when water, such as rainfall or snowmelt, and air come into contact with metallic sulfide ores. The sulfide (S^{-2}) then reacts to form sulfuric acid and sulfates. The sulfuric acid and sulfates react with the surrounding rock or soils to generate the metal concentrations within the acidic water and is then known as Acid Mine Drainage (AMD). This process continues as long as there is sulfide or sulfates, water, and air.

The primary metallic sulfides and secondary sulfates found at the Summitville Minesite are pyrite (iron sulfide), alunite (potassium aluminum sulfate), and jarosite (potassium iron sulfate). There are fourteen areas of concern at the Summitville Minesite including twelve which either generate or may potentially generate AMD. The fourteen areas are briefly described below in their general order of priority:

1. HEAP LEACH PAD: The HLP is approximately 55 acres in size and 127 feet deep at its lowest point. The Cropsy Creek was diverted around the HLP area and the HLP was then constructed in the former Cropsy Creek drainage bed. The HLP is underlain by a French Drain system and extends onto the toe of the CWP which is located upgradient within the Cropsy Creek drainage bed. The leach pad liner is leaking, causing the water within the French Drain to become contaminated with cyanide. The HLP consists of ore containing high levels of metallic sulfides sitting in a vat of cyanide and heavy metals contaminated water. In December of 1992, the Environmental Protection Agency (EPA) took over operations of the Site water treatment plant to prevent overflow of the contaminated water to the Wightman Fork and, ultimately, the Alamosa River during Spring runoff. Currently the HLP is maintained at a pH of 9 to prevent the evolution of hydrogen cyanide gas. It is currently proposed that the Heap be detoxified as one of four interim actions. This action will also address the potential acidification of the heap once the cyanide

is removed and a high pH is no longer maintained. The former continuous overflow of AMD to the HLP from the adjacent CWP is currently being addressed as discussed in #3 (Cropsy Waste Pile) below.

2. REYNOLDS ADIT SYSTEM: The Reynolds System is composed of the underground workings which still exist under the large open Mine Pit excavated by SCMCI, and the remaining adits which access those workings. The Adits include the Reynolds, the Dexter Crosscut, the Chandler, and the Iowa. The Reynolds Adit is the main adit which was driven to drain the workings and provide an access and haulage route. The Dexter Crosscut, a drift branching westward from approximately 100 feet into the Reynolds Adit, also provided drainage, access, and haulage. The Chandler Adit accesses the upper areas of the underground workings at a higher elevation than the Reynolds Adit. The Iowa Adit accesses even higher levels of the workings and areas near the rim of the Mine Pit. The Mine Pit was hydraulically connected to the Reynolds System and contributed much of the AMD observed at the Reynolds Adit. The EPA operated an interim treatment plant to treat the average 120 gallons per minute (gpm) of AMD which exited the Reynolds Adit.

Based upon the estimated release of 44.5 percent of total copper loadings directly from the Reynolds Adit, it was determined that plugging of this system be conducted as a time-critical Removal action. A contract to plug the Reynolds Adit System was awarded on October 4, 1993 and work began on November 22, 1993. After extensive technical considerations, only the Reynolds and Chandler Adits were ultimately plugged. The Dexter Adit was found to terminate approximately 450 feet from its intersection with the Reynolds so no plug was needed. Upon completion of the Reynolds plug, there was an immediate decrease in flow and a 65 percent reduction in copper concentrations from the Site overall. Copper loadings directly attributed to the Reynolds Adit were decreased by 97 percent.

On May 25, 1994, the Chandler Adit was discovered to be discharging high volumes of water from porous/fractured rock surrounding the plug. The leak was initially estimated at 340 gallons per minute (gpm) and peaked at 725 gpm in June 1994 with high concentrations of metals and low pH. However, this new contaminant source produced less flow and less copper concentrations than experienced from the Reynolds Adit system during the previous year. Work to fortify the Chandler plug was initiated in November 1994 and plug performance will be closely monitored through the 1995 spring runoff season. Since November 20, 1994, AMD exiting the Chandler has been treated through the PITS Water Treatment Plant and no longer discharges directly to Wightman Fork.

3. CROPSY WASTE PILE: The CWP was composed of approximately 6.5 million tons of low grade ore, overburden, and waste rock excavated from the main Mine Pit during SCMCI's mining operations. The CWP covered approximately 35 acres and was piled as high as 120 feet from the bottom of the old Cropsy Creek drainage bed in which it was placed. Although the CWP had been capped to prevent percolation of snowmelt and rainfall, upward infiltration of ground water has begun the process of acidifying the CWP and AMD discharges are occurring from the CWP. When the HLP was extended onto the toe of the CWP, the French Drain system beneath the CWP was severed from the system below the HLP. As a result, water backed up behind the liner of the HLP into the CWP - saturating that part of the CWP and creating a 5 million gallon reservoir of highly contaminated water within the bottom of the CWP.

To prevent the overflow of AMD into the HLP, it was determined that the CWP would be addressed as a non-time, critical Removal action. During development or, the Engineering Evaluation/Cost Analysis report, it became apparent that the same response action would also apply to the SDI and BMD, and that concurrent implementation would be cost effective. The response action selected in the Action Memorandum #4 issued by EPA on September 24, 1993 required consolidation of the various waste piles within the Mine Pits. Because this work would require more than one construction season to complete, the design and actual construction were phased. Phase I work was initiated on October 1, 1993 and concluded in February 1994. During this time, approximately 927,000 cubic yards of the Cropsy Waste Pile was placed in the Mine Pits. The waste materials were isolated from ground water by lining the surface of the Mine Pits with impermeable material identified on-site. A protective layer of lime kiln dust was placed on the liner prior to placement of the waste materials to neutralize any AMD generated during this work.

Phase II work was initiated in August 1994. The CWP was completed in November 1994 and the SDI/BMD are expected to be completed in December 1994. Phase II will have moved an additional 3.5 million cubic yards of waste material to the Miae Pits.

Since Phase III removal action work had not begun, EPA evaluated the removal action alternative selected in the Action Memo as one of its remedial alternatives for the CWP, SDI, BMD and Mine pits. This alternative was ultimately selected as the interim response action for those areas of the Site. This work will include construction of a final, impermeable cap and vegetation of the "footprint" areas below the CWP, SDI, and BMD.

4. WIGHTMAN FORK, ALAMOSA RIVER, TERRACE RESERVOIR (OFF-SITE): The release of large quantifies of AMD from the Site have occurred since the 1870's when mining first began, though the concentrations have significantly increased since the beginning of mining activities by SCMCI. Much of the AMD generated at

the Site finds its way into the Cropsy Creek or Wightman Fork creek, unless it is diverted for treatment. The Cropsy Creek flows into the Wightman Fork at the southeastern corner of the Site. The Wightman Fork, located on the northern boundary of the Site, empties into the Alamosa River approximately 4.5 miles from the Site. The Alamosa, in turn, flows into the Terrace Reservoir about 18 miles from the Site. There are three small wetland habitats along the Alamosa where several endangered species, including the bald eagle, whooping crane, and peregrine falcon have been identified. The closest wetland is 1.8 miles form the Wightman Fork confluence. The other wetland areas are 4.2 and nine miles domain form the confluence. These wetlands are all upstream of the Terrace Reservoir. Concerns regarding other water usage requirements, including drinking water and farm irrigation needs, are being investigated.

5. BEAVER MUD DUMP: The BMD encompasses 15 acres and consists of approximately 900,000 cubic yards of historic metallic sulfide tailings as well as overburden from SCMCI's operations. It is located immediately adjacent to and south of the Wightman Fork Creek and is a significant source of AMD. The BMD is also infiltrated by ground water and discharges AMD to the Summitville Dam Impoundment. This area is being addressed as part of the CWP Removal action and interim action.

6. SUMMITVILLE DAM IMPOUNDMENT: Formerly referred to as the Cleveland Tailings Pond, the SDI is a historic sulfide rich tailings pond located within the former Wightman Fork drainage bed. The Wightman Fork was routed around the impoundment. While the Impoundment only contains about 133,000 cubic yards of material, it is thought to be hydraulically connected to the Wightman Fork and, therefore, providing AMD directly into the creek. This area is being addressed as part of the CWP Removal action and interim remedial action.

7. FRENCH DRAIN SUMP: The French Drain is a collection system which was constructed underneath the CWP and HLP to intercept and mute ground water flowing from seeps below these units (CWP and HLP) back into the diverted Cropsy Creek. Because much of this ground water flows through the CWP or becomes contaminated with cyanide when passing below the HLP, it is currently routed to the water treatment systems or pumped directly into the HLP. While the French Drain is not itself a source generating contaminants, it serves as a point source discharge for contaminated water in a fashion similar to that of the Reynolds Adit system.

8. CLAY ORE STOCKPILE (Stockpile): The Stockpile is located just north of the CWP and HLP border and was originally meant to be ore for placement on the HLP. Because of its high clay content, SCMCI was unable to provide the special handling needed before the ore could be leached. The one million ton Stockpile was purposely created because of its high content of metallic sulfides and is considered to be a source of AMD.

9. MINE PITS: This is the location of the former orebody mined by SCMCI and the location of the veins that were historically mined within the Summitville mining district. The 100-acre Mine Pit has consumed most of the underground mine workings with the exception of the Reynolds Adit System described above. This area was and is highly mineralized and contains high concentrations of metallic sulfides. Approximately 70 million gallons of water (snow or rain) per year entered the Pit, passed through the remaining underground workings, and exited as AMD from the Reynolds Adit, prior to plugging. The Pit is the origin of the rock in each of the tailings areas on-site and the ore in the HLP. This area is being addressed as part of the CWP Removal Action and interim action. At this time, the Pit has been filled by the waste material and is free draining of surface water.

10. THE NORTH PIT WASTE DUMP: This refers to a large area located north of the Pit composed of waste rock and overburden from the Mine Pit. It contains relatively moderate amounts of metallic sulfides and is a potential source of AMD. The northern portion of the dump, primary the slope, below the 11,580, bench, was reclaimed and upper portions of the dump were regraded with some subsoil and topsoil placement during the 1991 operational season. Vegetation success has been limited due to high wind exposure.

11. GOMPERTS PONDS: These are a series of small ponds, located approximately 400 feet north of the HLP, that contained severely acidic and toxic metals contaminated water and sludges. The ponds were excavated and then covered with soils. It is unknown if any sludges or contaminated soils remain where the ponds were. If so, this area is another source of AMD.

12. ACID ROCK DRAINAGE SEEPS: There are over 48 potential acid rock drainage seeps identified on the Site. These are areas where ground water naturally comes to the surface though some may be a result of construction activities at the Site. The seeps have not yet been evaluated to determine if they are an AMD source.

13. MINE SITE ROADS: Many of the roads at the Site were constructed with waste rock from the Mine Pit. The material in these roads has not yet been evaluated to determine if they are an AMD source.

14. LAND APPLICATION AREAS: There are areas where cyanide contaminated AMD was sprayed onto the soils as a treatment method. Aeration, as a result of spraying, was meant to eliminate the cyanide contamination while the soils were supposed to attenuate the metals. These areas have not yet been evaluated to determine if they are a current AMD source.

Once these areas had been identified, the EPA was able to establish Remedial Action Objectives (RAOs) for the overall Site. Pursuant to 40 CFR section 300.43 (e)(2)(i), the RAOs were established to provide remedial goals for the Site and were developed in consideration of current regulatory guidelines, compliance with ARARs, and other identified limiting factors. The sitewide RAOs for the Summitville Minesite are:

1. Reduce or eliminate deleterious quality water flow from the Summitville Minesite into the Wightman Fork.

2. Reduce or eliminate the need for continued expenditures in water treatment for the Summitville Minesite.

3. Reduce or eliminate the acid mine/rock drainage from the manmade sources on the Summitville Minesite.

4. Reduce or eliminate any human health or adverse environmental effects from mining operations downstream from the Site, to include the Alamosa River.

5. Encourage early action and acceleration of the Superfund process for the Summitville Site.

An analysis of metal loadings attributable to each of the AMD source areas resulted in the development of five primary areas of focus. Many of these source areas are in drainages or are located where large mounts of surface or ground water are available for continued generation of AMD. The Cropsy-Wightman stream drainage system for the Site also serves as a way to transport the generated AMD contaminants off-site. The table below illustrates the copper loadings and flows from these drainage points as measured by SCMCI in July 1991. This approach is also based on the water quality data regarding copper loading into Wightman Fork. The table lists the contaminant sources, the yearly copper contribution to the creek from each source, and the relative percentage loading of each source:

CONTAMINANT SOURCES

SOURCE	POUNDS OF COPPER PER YEAR	RELATIVE PERCENT
Reynolds Adit	143,000	44.5
Cropsy Waste Pile	33,400	10.4
Heap Leach Pad		
overflow potential	84,000	26.2
French Drain	14,600	4.5
Summitville Dam Impoundment/ Beaver Mud Dump	17,000	5.3
Other	29,000	9.0
TOTAL	321,000	100.0

Due to the size of the Site and extent of the contamination, the sitewide interim remediation activities are being addressed in five separate, though related actions. These five actions are:

- Plugging the Reynolds and Chandler Adits
- Movement of the CWP, SDI, and BMD
- HLP Detoxification/Closure
- Sitewide Reclamation
- Interim Water Treatment

The first action of the containment/isolation and stabilization project was the plugging of the Reynolds and Chandler Adits. The second action is excavation of the CWP, SDI, and BMD, with subsequent placement of this material into the Mine Pits. Both of these removal actions are in progress under Emergency Response authority as discussed above.

The Phase III work for CWP, SDI and BMD, as well as the remaining three actions will be conducted as interim remedial actions. The CWP, HLP, and Reclamation work are expected to begin work during the 1995 construction season. The Water Treatment action will continue without interruption though modifications in actual treatment processes may be implemented during 1995.

1.4.1. Remedial Action Objectives and Goals

This IROD addresses the reduction or elimination of dissolved metal contaminants, the transportation of metal contaminants, and metal/cyanide complexes in surface water at the Site. This interim remedial action is a temporary measure to treat water while point sources are being stabilized. Reduction of contaminant load contributed by ground water or non-point sources requires further evaluation and may be addressed in future Site activities.

Water treatment contributes towards the protection of human health and the environment. Treatment of AMD and water containing cyanide is an interim remedial action contributing toward the final sitewide remediation goals.

Implementing this interim remedial action will achieve protection of human health and the environment. The remedial action goals for this interim action are:

- Compatibility with sitewide remedial action objectives;
- Reduction of contaminated water impacts to the aquatic receptors in the Wightman Fork, the Alamosa River, and the Terrace Reservoir during interim remedial activities;
- Flexibility in treatment of varied volumes and chemical makeup of water requiring treatment;
- Minimization of water treatment costs;
- Minimization of treatment waste products and waste disposal requirements; and
- Realization of practical resource recovery to lower overall treatment and Site remediation costs.

1.5 Site Characteristics

1.5.1 Nature and Extent of Contamination

The EPA (1992) identified the Contaminants of Potential Concern (COPC) based on elevated concentration and potential toxicity of mobilized chemicals. The COPC will be finalized upon completion of the Baseline Risk Assessment. These concentrations were compared to Site-specific background levels, which were determined by standard statistical analysis (Morrison Knudsen Corp., 1994). Potential adverse effects on human health and the welfare of wildlife were preliminarily assessed (EPA, 1992). The COPC identified for the Site are copper, cadmium, chromium VI, lead, silver, zinc, arsenic, aluminum, iron, mercury, manganese, and cyanide.

All of these contaminants, except cyanide, are found at the Site in naturally occurring minerals and compounds. They are made soluble during the AMD-generating chemical process. The AMD process is accelerated by the mining activities which took place at the Site.

1.5.1.1 Acid Mine Drainage

At Summitville, mining activities resulted in additional sulfidic material surface area available for contact with oxygen and water. Air and water contact with the additional surface area provided by broken rock accelerates oxidation of minerals and creation of low pH drainage. This drainage water is high in acidity, sulfate $(SO4)^{-2}$ ions, and dissolved metals.

AMD water contributes metal loads to Wightman Fork and the Alamosa River. This creates adverse conditions preventing the growth and maintenance of a healthy aquatic ecosystem. These adverse effects have been noted in various studies of water quality of Wightman Fork and the Alamosa River.

1.5.1.2 Water Containing Cyanide

Commercially manufactured sodium cyanide (NaCN) was used at the Site for extracting precious metals from ore grade materials. Cyanide has been used for this purpose in the mining industry since the late 1800's. Cyanide is found either in simple form or in combination with other elements. Simple cyanide forms designated as "flee" cyanide are the cyanide radical, CN-, and hydrogen cyanide, HCN. Cyanide also combines or complexes with alkali metal ions, heavy metal ions, and transition elements. The complex cyanide bonding is very strong, moderately strong, or weak (defined by tendency to disassociate in an acidic environment).

Presence of excess hydrogen ions (acid) will lead to the formation of HCN, depending on the strength of the metal/cyanide bond.

Cyanide content is found in residual process water contained in the HLP. The predominant form of cyanide in solution is a Weak Acid Dissociable (WAD) complex (complex that has a moderately strong bond and dissociates at a pH of 4.5 or greater) with copper. Complexes with other elements - silver, sulfur, gold, iron and others - are also present. Thiocyanate (SCN) is present in significant quantities. The thiocyanates may migrate through the water treatment train into Wightman Fork. The pH of contained residual process water within the HLP averages about 9.3.

Leaks in the HLP containment liner result in the presence of cyanide in drainage that surfaces downgradient of the HLP. These drainage streams (from the Valley Center Drain (VCD), and several seeps in and below HLP Dike 1) are mixtures of residual process water, AMD, and ground water. The AMD portion results in low pH (2.5 - 3.5), and cyanide exists as either a metal/cyanide complex (primarily with copper), or as free cyanide (HCN). These streams are routed to the French Drain Sump to prevent release to Wightman Fork and Alamosa River drainages. The water is pumped to the HLP and mixed with residual process water, or treated separately.

1.5.1.3 Description of Impacted Water

Tables 1 - 6 summarize data collected during water monitoring before treatment and during discharge of surface water to Wightman Fork. The tables include recordings of copper and cyanide loadings from May 1993 through June 1994. During this period, monitoring emphasis was given to copper and cyanide because these were the chemicals of highest concentration during the ERRA. There was also a concern because of the potential toxicity of cyanide.

Table 1 shows data representing the copper load (lbs.) transported by the Site water. The first group exhibits copper load from water pumped from the French Drain (FID) Sump. This sump contains water from the VCD and AMD seeps.

The second data group within Table 1 illustrates the copper concentration of water contained in the HLP. This includes water pumped from the FD Sump, water that surfaced at the toe of the CWP, and process water contained in the HLP. All water in the HLP is treated to remove cyanide and copper, as well as other metals, before release to Wightman Fork.

The underground workings section presents data on copper load that was transported by water exiting from the Reynolds Adit and the Chandler Adit. Also shown is the amount of copper removed through treatment at the Portable Interim Treatment System (PITS). The PITS treated water exiting the Reynolds Adit, the Iowa Adlt, and some contaminant surface runoff. The plant was deactivated after the Reynolds Adit plug was completed.

The remaining sections of the table present the copper content of surface water discharged into Wightman Fork during this time period. These include water from Cropsy Creek, seep LPD-2 (which feeds into Cropsy Creek), and Pond P-4 (a sediment pond that receives surface runoff from the mine pit area, haul roads, and other runoff). Other streams that contributed copper load to Wightman Fork include drainage from the SDI, the NPWD, the Clay Ore Stockpile, and treatment plant effluent.

Also shown are the pounds of copper that would have been added to Wightman Fork if water had flowed into Wightman without treatment. Annual totals from July 1993 to June 1994 are given to the fight of monthly totals. The twelve month period, July 1993 through June 1994, represents the time frame when existing treatment facilities utilized maximum capacity.

Table 2 shows monitored cyanide loading (lbs.) or the potential for cyanide loading to Wightman Fork during the same period.

Table 3a shows monitored flow rate for streams which are capable of carrying contaminant load to Wightman Fork. High and low flow rates illustrate seasonal fluctuations. Combined monthly totals illustrate potentially required treatment volumes.

Table 3b shows the total gallons for streams capable of carrying contaminant load to Wightman Fork. This table also shows the treatment plant capacity measured in total gallons.

Table 4 shows other monitored constituents (manganese and iron) that should be taken into consideration in the selection of treatment processes. Manganese removal to <1 mg/liter is necessary before cyanide destruction can take place. Significant iron content can produce sludge volumes that affect plant efficiency.

Tables 5 and 6 show copper and cyanide concentrations monitored at station WF 5.5 on Wightman Fork from May 1993 through June 1994.

General descriptions of monitored surface water affected by conditions at the Site are given below. Figure 4 shows contaminated surface water streams.

Stream A - The Valley Center Drain (VCD)

General: Comprised of drainage from the CWP, ground water from beneath the HLP, and leakage from HLP containment. Contains cyanide as a result of leakage from the HLP. CWP drainage contributes low pH and elevated metals.

Volume: Significant flow throughout the year. Peak flow is concurrent with spring snowmelt. High flow (78 gpm)recorded in April 1994; low flow (57 gpm) was recorded in June 1993.

Loading: Based on copper as the indicator, the VCD ranked as the 4th highest peak flow career of metals. 8,473 lbs. of copper dissolved in solution were transported by drainage from July 1993 through June 1994.

Stream B - Cropsy Waste Pile Drainage

General: Comprised of ground water flow from seeps and upgradient drainage through colluvium and alluvium (Geraghty & Miller, 1992). Includes precipitation (snowmelt and rain fall) infiltrating through mine waste materials. Significant aluminum content effects must be considered when selecting a treatment process. Volume and makeup are expected to materially change with planned relocation of CWP materials.

Volume: Seasonal release to the surface at the toe of the CWP. Year round contribution to the VCD. High flow (364 gpm) recorded in May 1993. Surface flow was not observed at the toe of the CWP between January - April 1994.

Loading: Based on copper as the indicator, water surfacing at the toe of the CWP is the second highest peak carrier of metals. 23,305 lbs. of copper dissolved in solution were transported by drainage from July 1993 through June 1994 (includes water sent to the CWTP).

Stream C - Drainage from Underground Workings

General: Comprised of ground water and precipitation (snowmelt and rainfall) infiltrating the mine pit area. These infiltrating waters draining through mineralized rock into the remaining underground workings have historically surfaced as flow from the Reynolds Adit. Comparatively less water volume drains from the Iowa Adit. The Reynolds and Chandler adits have been plugged. The long-term effects of plugging the Reynolds Adit in February 1994 and Chandler Adit in March 1994, and the consequent rise in the South Mountain water table have not been determined. In May 1994, an AMD stream developed as discharge from the Chandler Adit. It has been observed that the water is flowing between the top of the plug and the roof of the adit (Abel, pets. comm., 1994). Peak flow from the Chandler Adit leak in June 1994 was 661 gpm with a copper concentration of 409.40 mg/l and a pH of 2.16, determined by sampling the stream just outside the adit entrance. This was almost "instantaneous" (the discharge increased from 0 gpm to 661 gpm in 11 days), indicating a direct relationship between the rise in the South Mountain water table and the filling of the adit system with water. By the end of July 1994, the flow of the AMD Stream decreased to 130 gpm with a copper content of 268 mg/l and a pH of 2.30. Eventual volume of AMD that may require treatment is unknown. Corrective measures are planned.

Volume: Significant flow throughout the year. High flow from the Reynolds Adit (763 gpm) was recorded in June 1993; low flow from the Reynolds Adit (6 gpm) was recorded in April 1994.

Loading: Based on copper as the indicator, Stream C is ranked as the highest peak flow carrier of metals. 198,221 pounds of copper dissolved in solution were transported by drainage from July 1993 through June 1994. Peak flow of AMD from the underground workings in June 1994 was 14% less than flow in June 1993. Copper load from underground workings in June 1994 was approximately 23% less than the load in June 1993 (Table 4). In July 1994 volume from the underground workings was 25% less than in July 1993. Copper load from underground workings in July 1994 was 15% less than in July 1993.

Stream D - Summitville Dam Impoundment and Beaver Mud Dump drainage.

General: Comprised of the surface drainage into the tailings pond and surrounding area, and the ground water migration through the mud dump. Possible ground water migration through tailings contained in the pond. Includes precipitation (snowmelt and rainfall) infiltrating through BMD materials. Volume and makeup of thin stream is expected to materially change with planned solid waste relocation in 1994-95 (Cropsy Phase II operations).

Volume: High flow (202 gpm) was recorded in May 1993; low flow (33 gpm) was recorded in November 1993. Monitoring was not possible from January 1994 through April 1994, due to snowpack.

Loading: Based on copper as the indicator, Stream D is ranked as the third highest peak flow carrier of metals. 12,294 lbs. of copper dissolved in solution were transported by drainage from July 1993 through June 1994.

Stream E - North Pit Waste Dump drainage

General: Comprised primarily of surface runoff from waste dump materials. There is some ground water seepage.

Volume: Significantly varies with precipitation (rainfall and snowmelt). Affected by spring runoff. High flow (284 gpm) was recorded in May 1993; low flow (1 gpm) was recorded in October 1993. Monitoring was not possible from November 1993 through April 1994, due to snowpack.

Loading: Based on copper as the indicator, Stream E is ranked as the 6th highest peak flow carrier of metals. 4,321 lbs. of copper dissolved in solution were transported by drainage from July 1993 through June 1994.

Stream F - Clay Ore Stockpile Drainage

General: Comprised of surface drainage migration through lower portions of the waste dump and precipitation (snowmelt and rainfall) infiltrating through upper level materials. Water migrating from beneath the CWP may also contribute.

Volume: High flow (66 gpm) was recorded in June 1993; low flow (37 gpm) was recorded in May 1994.

Loading: Based on copper as the indicator, Stream F is ranked as the 8th highest peak flow carrier of metals. 1,113 lbs. of copper dissolved in solution were transported by drainage from July 1993 through June 1994.

Stream G - Sediment pond P-4 drainage

General: Comprised of surface drainage from upgradient disturbed areas. Includes some contribution from Iowa adit drainage.

Volume: Highly variable, dependent on precipitation events. High flow (948 gpm) was recorded in May 1994; low flow (4 gpm) was recorded in November 1993.

Loading: Based on copper as the indicator, Stream G is ranked as the 5th highest peak flow carrier of metals. 4,508 lbs. of copper dissolved in solution were transported by drainage from July 1993 through June 1994.

Stream H- Drainage from Cropsy Creek

General: Comprised of surface drainage from upgradient undisturbed areas. Rerouted around the CWP and HLP areas during SCMCI operations. Receives some metals loading from surface runoff from the CWP and seep LPD-2, downgradient from the HLP and Dike 1. May receive loadings from effected ground water. Route does not go through sediment control features.

Volume: Peak flow is concurrent with spring runoff. Significantly affected by precipitation (snowmelt and rainfall). High flow was recorded in May 1993; low flow was recorded in February 1994.

Loading: Based on copper as the indicator, Stream H is ranked as the 7th highest peak flow carrier of metals. 1,737 lbs. of copper dissolved in solution were transported by drainage from July 1993 through June 1994.

The affected stream segments are summarized in the following table. The streams are ranked in decreasing order according to the metal load during peak flow.

Ranking of Surface Water Streams at Peak Flow
without Operation of CWTP, CDP and MRP

Metal Load at Peak Flow*	Stream**
1	Stream-C- Underground-Workings Drainage
2	Stream B- CWP Drainage
3	Stream D- SDI/BMD Drainage
4	Stream A- VCD
5	Stream G- P-4 Drainage
6	Stream E- NPWD Drainage
7	Stream H- Cropsy Creek Drainage
8	Stream F- Clay Ore Stockpile Drainage

* Rankings are listed in decreasing order.
** Table does not include the HLP wastewater stream.

French Drain Sump Inflows

The FD Sump was originally constructed to prevent drainage from the VCD (Stream A) from entering the Cropsy Creek and Wightman Fork. A collection and pumping facility was installed VCD drainage was found to contain cyanide. The sump was also utilized to contain other contaminated water. These drainages (described below) were found to be contaminated in later years. Tables 1 - 3b summarize data for copper, cyanide, and water volume for these streams. General descriptions follow.

FD Sump -1 Seepage from Dike 1

General: Comprised of water exiting a point at the base of Dike 1.

Volume: Peak volume (1,785,600 gal., June 1993) is concurrent with spring snowmelt.

Loading: At peak flow, Stream FD Sump-1 transports up to 83 lbs of copper per day. Load declines to less than 3 lbs per day as flow decreases.

FD Sump -2 Seepage from the Dike 1 ramp

General: Comprised of water exiting a point on the access road that flanks Dike 1.

Volume: Peak volume (820,000 gal. in June 1993) is concurrent with spring snowmelt. Flow ceases soon after the peak snowmelt period. Water is acidic, and contains cyanide.

Loading: At peak flow, Stream FD Sump-2 transports up to 5.7 lbs of copper per day. Load declines to less than 1 lb. per day as flow decreases.

FD Sump -3 Drainage from beneath the HLP

General: Comprised of water exiting rock drains built to divert water during HLP construction at 11,510 and 11,530 elevations. Discharges are combined and routed to the FD Sump. There is a wide range in copper content. Contains a slight amount (0.12 mg/l) of cyanide at peak volume discharge.

Volume: Peak volume (1,116,000 gal. in June, 1993) is concurrent with spring snowmelt. Significant flow continues throughout the year.

Loading: At peak flow, Stream FD Sump-3 transports up to 27 lbs of copper per day. Load declines to less than 1 lb. per day as flow decreases.

1.5.2 Contaminant Transport and Migration

1.5.2.1 Surface Water

Surface water is considered the most significant media for off-site transport of metals. Surface water has been impacted by mining operations from the Site throughout the reach of Wightman Fork, from the Site to the Alamosa River, and within the Alamosa River from Wightman Fork to Terrace Reservoir and points further downstream. According to the Conceptual Sitewide Remediation Plan prepared for the EPA, it has been determined that the Site is the predominant source of metals loading to the Alamosa River system.

As pH of water rises from the addition of water with higher pH, iron precipitates from solution as a hydrated iron (III) oxide product (ferric hydroxide). This forms the red or yellow staining seen on rocks in the streams or on banks. Copper, cadmium and zinc will co-precipitate with iron precipitates. Metals concentrations are further reduced by dilution from downstream tributaries. COPC could be biologically transported through an aquatic food chain, and could be transported to birds, animals and humans. The Baseline Risk Assessment (BRA) has not been completed; however, qualitative risk analysis has been performed by EPA which verifies this dam (ERT, 1993). The BRA is scheduled for completion in 1995. Currently, the full range of COPC is being reassessed and additional contaminants of concern (COC) may be identified in the BRA.

1.5.2.2 Ground water

Ground water depths vary at the Site. In general, water levels are relatively close to the surface except in the vicinity of the old mine workings where depth to water can be as much as 300 feet. The old workings act as effective underdrains. This can be seen by the flow of water from the adits. It is anticipated that the ground water level will rise as water backs up behind the plugged Reynolds and Chandler Adits.

The ground water occurs in surficial deposits consisting of colluvium, alluvium, and/or glacial moraine; and fractured andesite of the Summitville Formation. Ground water flow is within the weathered and fractured bedrock and, within alluvium near the Cropsy Creek and Wightman Fork channels. Ground water flow and metals are capable of being transmitted to Wightman Fork through the alluvial and bedrock systems. Ground water is generally shallow (0.2 to 25 feet within the alluvium) and flows northeast in both the Cropsy and Wightman Fork drainages.

Shallow ground water at the Site is present as a series of intermittent, perched system. The perched aquifer system contributes to recharge of the shallow fractured bedrock system. No regional ground water table has been identified at the Site. The ground water close to the surface is strongly influenced by precipitation. During spring runoff, these shallow systems discharge to surface water. Numerous springs and seeps are evident throughout the Site and most flow in direct response to precipitation.

1.5.2.3 Soil and Air

Site cover consists of topsoil, silt, clays, and gravel. The topsoil is described as grey/brown/orange, non-plastic with a trace of roots and sand. The clays are low to medium plasticity with some gravel. The gravel is indicative of colluvial deposits or tailings. The disruption of the surface soils may be a secondary source of excess metals migration.

1.5.3 ARARs

ARARs are "applicable" or "relevant and appropriate" requirements of federal or state law which address a hazardous substance, pollutant, contaminant, remedial action, location or other circumstance found at a Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) Site. Refer to Table 7 for a detailed summary and discussion of ARARs. The NCP defines "applicable" requirements as cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under Federal or State law that specifically address a hazardous substance, pollutant, contaminant, remedial action location or other circumstance found at a CERCLA site. "Relevant and appropriate" requirements address problems or situations sufficiently similar to those encountered at the CERCLA site that their use is well suited to the environmental or technical factors at a particular site. (See 40 CFR Section 300.5.)

ARARs are grouped into three categories:

- Chemical Specific
- Action Specific
- Location Specific

Chemical specific ARARs include health or risk based narrative standards, numerical values, or methodologies that, when applied to site-specific conditions establish the acceptable amount or concentration of a chemical that may remain or can be released to the environment. Action specific ARARs are usually technology or activity-based requirements or limitations on actions taken with respect to hazardous substances, pollutants, or contaminants found at CERCLA sites. Location specific ARARs are restrictions placed on the concentration of hazardous substances, pollutants, or contaminants or the conduct of activities solely because they occur in special locations. Examples of special locations include floodplains, wetlands, historic places and sensitive ecosystems or habitats. (See "CERCLA Compliance with Other Laws Manual Draft Guidance," EPA/540/G-89/006(August 1988.)

In addition, the NCP has identified a fourth category of information "to be considered" when evaluating remedial alternatives, known as TBCs. TBCs represent Federal and State advisories, criteria or guidance that are not ARARs, but are useful in developing CERCLA remedies. (See 40 CFR 300.430(g)(3).)

The analysis of ARARs has been limited to the scope of the interim action. The NCP allows waiver of ARARs for interim remedial measures that do not exacerbate site problems or interfere with final remedy (40 CFR 300.430(f)(1)(ii)(C)(1) and 55 FR 8747). Other ARARs may be involved in enacting final remedy(ies).

The sitewide ARARs were identified in the addendum to the HLP FFSs. In response to comments submitted during the public participation process on the CWP FFS and Proposed Plan, however, EPA is further defining the applicable or relevant and appropriate requirements from Federal and State laws or regulations which must be met by any alternative implemented as the CWP interim remedial action. Since the sitewide ARARs have already been identified in the "ARARs Addendum to the HLP Focused Feasibility Study Report", this further refinement of ARARs as they relate to the CWP IROD represents only a minor change to the CWP FFS and Proposed Plan. Consistent with its "Interim Final Guidance on Preparing Superfund Decision Documents", OSWER Directive 9355.3-02 (June 1989), EPA has determined that this minor change will have little or no impact on the overall scope, performance, or cost of each alternative as originally presented in the CWP FFS or Proposed Plan. The following sitewide ARARs, or relevant portions of the sitewide ARARs, must be met in accordance with Section 121(e) of CERCLA and 40 C.F.R 300.430 of the NCP by each potential CWP interim remedial action alternative:

1.5.3.1 Chemical Specific ARARs

Surface Water ARARs

The Colorado Water Quality Standards (CWQS) establish a system for classifying state surface waters and procedures and criteria for assigning numeric water quality standards. (See 5 CCR 1002-8, Sections 3.1.0 through 3.1.17.)

- Colorado Water Quality Standards, Applicable

Criteria for Stream Classification

The CWQS require that surface waters be:

> classified for the present beneficial uses of the water, or the beneficial uses that may be reasonably expected in the future for which the water is suitable in its present condition or the beneficial uses for which it is to become suitable as a goal.... Where the use classification is based upon a future use for which the waters are to become suitable, the numeric standards assigned to such waters to protect the use classification may require a temporary modification to the underlying numeric standard... (See §3.1.6.)

The CWQS employ four broad types of beneficial use to frame the classification process:

- recreational
- aquatic life
- agriculture
- domestic water supply

Recreational Use

The recreational uses are divided into two classifications. Recreational Use, Class 1 - Primary Contact, addresses surface water quality concerns where ingestion of small quantifies of water during the use is likely to occur. Recreational Use, Class 2 - Secondary Contact, focuses on streamside activities where ingestion of water is unlikely to occur. The effect of the recreation classification on numeric water quality criteria is limited, the primary consideration being the concentration of fecal coliform bacteria. The Summitville Minesite is unlikely to contribute bacterial contamination to the watershed. For that reason, the recreational use classifications have been met and will not be considered further.

Aquatic Life

Two aquatic life classifications are currently promulgated for stream segments of interest. Class 1 cold water aquatic life is defined as:

> ...waters that (1) currently are capable of sustaining a wide variety of cold water biota, including sensitive species, or (2) could sustain such biota but for correctable water quality conditions. Waters shall be considered capable of sustaining such biota where physical habitat, water flows or levels, and water quality conditions result in no substantial impairment of the abundance and diversity of species. (See §3.1.13(1)(c)(i).)

Class 2 cold and warm water aquatic life is defined as:

> ...waters that are not capable of sustaining a wide variety of cold or warm water biota, including sensitive species, due to physical habitat, water flows or levels, or incorrectable water quality conditions that result in substantial impairment of the abundance and diversity of species. (See §3.1.13(1)(c)(iii).)

Domestic Water Supply

Domestic water supply is defined as:

> ...suitable or intended to become suitable for potable water supplies standard treatment ... these waters will meet Colorado drinking water regulations... (See §3.1.13(1)(d), emphasis added.)

Agricultural Use

Agricultural use is defined as:

> ...suitable or intended to become suitable for irrigation of crops usually grown in Colorado and which are not hazardous as drinking water for livestock... (See §3.1.13(1)(b).)

Three segments of the Alamosa River are classified for various uses according to this system: Segment 6, the Wightman Fork at and below the mine; Segment 3b, the Alamosa River from immediately above the confluence with Wightman Fork to Terrace Reservoir; and Segment 8, Terrace Reservoir. Figure 5 shows segments of the Alamosa River Basin.

Segment 6 is classified for Recreation Class 2 and Agriculture. It is not classified for aquatic life. No numeric water quality standards have been assigned. The lack of an aquatic life classification was based on testimony received at the Colorado Water Quality Control Commission (WQCC) hearing. The WQCC determined that an aquatic life classification cannot be attained within 20 years.

Segment 3b is classified as Class 1 Cold Water Aquatic Life. Numeric Standards are set for surface water downstream of the confluence of Wightman Fork and the Alamosa River.

Terrace Reservoir is classified as Class 2 Cold Water Aquatic Life. This classification recognizes a limit on the ability of Terrace Reservoir to sustain a diverse aquatic community.

Numeric Water Quality Standards

The CWQS provides a three-tiered structure for establishing numeric water quality standards. For unimpacted high quality waters, numeric levels known as the "Table Value Standards" (TVS) are established and presumed to be protective. For impacted waters where pollutant concentrations exceed TVS values but the beneficial uses are adequately protected, Ambient Quality-Based Standards can be adopted. For impacted waters where beneficial uses are not currently adequately protected, TV'S are adopted as a goal. Temporary modifications to numeric standards may be adopted in these areas. Where classified uses are not being protected and a use attainability analysis has found nonattainability, Site-Specific-Criteria-Based Standards can be developed. The TVS and Ambient Quality-Based Standards are applicable regulations for determining compliance with surface water discharges at the Site. Segment 3b of the Alamosa River is downstream of the Site at the confluence of the Wiltman Fork and the Alamosa River. These regulations were used to establish promulgated standards in this segment of the Alamosa River. Specifically, the Classifications and Numeric Standards for Rio Grande Basin are found in Section 3.6.6. of the regulation. Table 8 illustrates these levels. These standards are categorized into acute and chronic limits. Acute limits represent an upper level not to be exceeded in any 24 hour period. Chronic standards are average levels which can not be exceeded in a 30 day period.

Table Value Standards

The TVS are based upon the Federal Water Quality Criteria. The TVS, however, have been adjusted to protect the beneficial uses of Colorado waters (See §3.1.7(b)(i).) The TVS for aluminum (acute), arsenic (acute), lead (acute/chronic), nickel (acute/chronic), selenium (acute/chronic), silver (acute/chronic), zinc (acute/chronic), chromium VI (acute/chronic), chromium III (acute), mercury (chronic), manganese (chronic), cadmium (acute/chronic), pH, dissolved oxygen, Fecal Coli, ammonia, chlorine, sulfide, boron, nitrate and cyanide are set at Segment 3b. It is important to note that many of the TVS for protection of aquatic life from metal pollutants are hardness dependent. The WQCC has adopted an acute and a chronic copper standard for Segment 3b. The acute copper standard for Segment 3b is established using the TVS; however, the WQCC has adopted a less stringent temporary modification to this standard based upon WQCC heating testimony. The EPA has adopted and will meet the ambient quality based chronic copper standard as applicable for this interim action and is not using the less stringent acute copper standards from the TVS or the less stringent August 1994 temporary modification. The IAL, as monitored at WF-5.5, were developed to meet the more stringent ambient quality-based chronic copper standard at Segment 3b.

Ambient Quality-based Standards

Ambient quality-based numeric surface water quality standards are the mechanism where limited water quality impacts are controlled through less stringent water quality standards. Ambient quality-based standards are specifically intended to address circumstances where natural or irreversible man-induced ambient water quality levels are higher than the specific numeric levels contained in the TVS Tables I, II, and III, but are determined "adequate to protect classified uses." (See §3.1.7(1)(b)(ii).) The chronic standard for copper is established at Segment 3b using this regulation. Copper is one of the primary contaminants of concern for water quality. The chronic copper standard was used as the most strict ARAR for copper at the Site. The interim action levels (IAL) were developed using this standard. The chronic standard for iron also falls into ambient water quality standards. There are no acute iron standards.

To evaluate the ability of alternatives to meet the stream classification and numerical standard of the CWQS ARARs, EPA established interim action levels (IAL) for water quality. These IAL can be found at page 23 of the Water Treatment FFS. The IAL are developed using a model which utilized high flow and low flow average concentrations of the contaminants to set threshold loadings allowable at Wightman Fork monitoring point 5.5. Numerical standards that would enable the river water quality to meet the water quality ARAR at Segment 3b under average conditions were then calculated. Based upon the WQCC numeric water quality standards for Segment 3b, the TVS levels were used for all COPC at the Site with the exception of copper and iron. EPA used the WQCC ambient quality standard for copper and iron. The ambient level for copper is 30 ug/l based upon the 85th percentile ambient data in Segment 3a. The methodology used to develop these levels is similar to the criteria applied in the development of the NCL, that is, back modeling the contaminant loading from the promulgated ARARs at the Alamosa River. These IAL are formally adopted as remedial goals in the IRODs.

The discharge monitoring point, WF-5.5, is the interim monitoring point for the Site, and the IAL are the interim water quality standards during this remedial action five year period. It is important to note that the IALs are not "interim" due to their inability meet ARARs; rather, EPA believes that these ARAR-derived limits at the point of compliance do attain the numerical standards at Segment 3b. The ability of the IAL to achieve the applicable water quality standards, however, will be reassessed by EPA upon the completion of the quantified Risk Assessment and the State of Colorado use-attainability study. The results of these efforts will be incorporated into a final remedy.

- Federal Water Quality Criteria, Applicable

The preamble to the proposed NCP states:

> (a) State numerical WQS is essentially a site-specific adaptation of a Federal Water Quality Criteria (FWQC), subject to EPA approval, and, when available, is generally the appropriate standard for the specific body of water." (See 53 FR 51442, right column, top.)

As noted above, the FWQC would only be applicable in the absence of current, segment specific CWQS. In this circumstance, current, segment specific CWQS are available and will be applied as the surface water quality ARARs for the Site. The FWQC are considered applicable since this ARAR establishes the basis for the State of Colorado's numerical standards.

<u>Ground Water ARARs</u>

The Colorado Ground Water Standards (CGWSs) provide for identification of specified ground water areas, classification of the specified areas, and numeric ground water quality standards.

5 CCR 1002-8 establishes a system for classifying ground water and adjusting water quality standards to protect existing and potential beneficial uses. The ground water classifications are applied to "specified areas," a concept identified in the definitions and explained in Section 3.11.4(c)(1). Those ground waters not classified as within "specified areas" may be subject to Statewide radioactive material standards listed in Section 3.11.5(c)(2) of the Basic Standards of Ground Water, 3.11.0 (5 CCR 1002-8) and organic standards identified in Table A of Section 3.1.5(c).

Since the Colorado Water Quality Commission (WQCC) has yet to classify the Site as a "specified area," there are no currently applicable or relevant and appropriate Colorado Ground Water numeric standards for the Site. However, since the publication of the Water Treatment FFS, the WQCC has adopted an interim narrative standard for all unclassified ground waters of the State that supplements the Statewide standards for radioactive materials and organic pollutants established in Section 3.11.5(C) of the Basic Standards for Ground Water. This narrative standard requires that ground water quality be maintained for each parameter at whichever of the following levels is less restrictive:

(i) existing ambient water quality as of January 31, 1994, or

(ii) that quality which meets the most stringent criteria set forth in Tables 1 through 4 of "The Basic Standards for Ground Water."

Ambient water quality is established by agencies "with authority to implement this standard" using "their best professional judgment as to what constitutes adequate information to determine or estimate existing ambient quality, taking into account the location, sampling date, and quality of all data available" prior to January 31, 1994. Based on Rule 1, Section 1.1(5) of the Mineral Rules and Regulations, EPA believes the Mined Land Reclamation Board is the agency that has the primary authority to implement the narrative standard for ground water at the Summitville Site. MLRB and WQCD established Numeric Criteria Levels (NCL) for surface and ground water quality at the Summitville Site in SCMCI's operating permit, as well as its 1991 Settlement Agreement between SCMCI and the State of Colorado. These NCL are not applicable or relevant and appropriate, since they are not legally binding, promulgated regulations. However, these standards have been considered by EPA in establishing its interim action levels for water quality because they provide useful information or recommended procedures in addressing the interconnected ground water and surface water at the Site.

This interim ground water narrative standard, since it became effective on August 30, 1994, was not identified as an ARAR in any of the FFSs for the Site. However, since compliance with this ground water ARAR will have little or no impact on the overall scope, performance or cost of the alternatives evaluated, inclusion of this ARAR represents only a minor change to the FFS and Proposed Plan. See, "Interim Final Guidance on Preparing Superfund Decision Documents," OSWER Directive 9355.3-02 (June 1989), at p. 5-3.

EPA further expects that once the CWQC completes its use sustainability study and classifies Site ground water, the interim narrative ground water standard will be replaced by a "specified area" classification or "site-specific" standard for the Site. This ground water ARAR will be attained by the final remedial action(s) for the Site.

Storm Water Management and Effluent Limitations ARARs

Storm water management is governed by the storm water permitting requirements and the Categorical Standards for Ore Mining and Dressing. Both the storm water permitting program and the categorical standards are as applied pursuant to the Colorado Discharge Permit System. Requirements are collection and treatment of storm waters using the Best Available Technology (BAT) for those storm waters which contact mine waste. In addition, both regulatory programs require implementation of Site-specific Best Management Practices (BMP). The BMP emphasize storm water diversion and land/soil reclamation to minimize the contact of storm water with mine wastes.

- Copper, Lead, Zinc, Gold, Silver and Molybdenum Ores Subcategory Effluent Limitations, Relevant and Appropriate

This ARAR applies to "process waste waters" only. Process waters are defined in 40 CFR 401.11(q) as:

> "any waters which, during manufacturing or processing, comes into direct contact with or results from the production of any raw material, intermediate product, finished product, by-product, or waste product."

The effluent limitations found in 40 CFR 440.103 would be appropriate and relevant to the Water Treatment FFS activities but not applicable because the discharges are not "process waste waters." The IAL established by EPA to meet the surface water quality ARARs are more stringent than these categorical effluent limitations.

- Colorado Discharge Permit System Regulations/Federal Storm Water Permitting Requirements

Colorado's authority to require permits for the discharge of pollutants from any point source into waters of the state are derived from the Federal National Pollutant Discharge Elimination System (NPDES) regulations. See 40 CFR Part 122. Colorado's NPDES based program can be found in the Colorado Discharge Permit System Regulations (CDPSR). The CWQCC Division Permit issued for the treatment plant at the Site (CDP #CO-0041947), dated November 12, 1991, is the CDPSR document for the Site. Additional permit modification activities are documented in the July 1991 Settlement Agreement and the July 1992 Amendment to the Settlement Agreement.

Storm water is defined in NPDES program as "storm water runoff, surface runoff, snow melt runoff, and surface runoff and drainage". (See 40 CFR 122.26(b)(13).) A permit application is required for active and inactive mining sites where an owner can be identified and when discharges of storm water runoff from mining operations come into contact with any overburden, raw material, intermediate product, finished product, by product, waste product or areas where tailing have been removed. (See 122.26(b)(14)(iii).) As such, the substantive NPDES Storm Water permit requirements are applicable to discernable surface flows of storm water that contacts waste rock, the crushed ore currently contained in the heap leach pads, wet waste rock (mud), clay ore, or tailings at the Summitville Minesite. Infiltration is not covered by this program. (See 55 FR 47996, left column, center.)

The storm water permit regulations require compliance with Sections 301 and 402 of the Clean Water Act. Sections 301 and 402 require use of Best Available Technology to control toxic pollutants, and where necessary, further control to achieve ambient water quality criteria. In addition, the storm water regulations require implementation of stormwater BMP as part of the comprehensive program.

EPA has established effluent limitation guidelines for storm water discharges from the Ore Mining and Dressing category. These effluent limits require application of BAT to the Ore Mining and Dressing category. In those regulations, EPA has defined "mine" broadly and in a manner which coincides with the definition provided in the Storm Water Permit requirements. (See 40 CFR 440.132(g).) The effluent limitation guidelines for Ore Mining and Dressing also provide an exemption for overflow of excess storm water caused by a greater than a 10 year 24 hour precipitation event when a facility has met certain design and operational prerequisites. This exemption remains in effect as part of the new independent storm water permitting program. (See 55 FR 48032, right column, bottom.)

Both the effluent limits and the storm water permitting program require application of BAT and, if necessary, additional controls to meet ambient water quality standards. In addition, both programs require implementation of stormwater BMP. The only jurisdictional distinction is that the Ore Mining and Dressing Category effluent limits are not applicable, but instead relevant and appropriate. The recognition by the storm water permit program of the overflow exemption demonstrates the existing equivalence of the programs. Thus, attainment of the Effluent Guidelines and Standards for Ore Mining and Dressing will ensure attainment of the storm water discharge requirements.

Eight outfails were identified at the Summitville Minesite which meet the point source discharge requirement for storm water permitting. The discharge from each of these outfalls have been attributed to one of the three categories of precipitation related discharges defined by the storm water regulations. (See 40 C.F.R. 122.26(b)(13); 55 Federal Register at 48065.

Pursuant to the NPDES Storm Water Permitting requirements and in response to obligations under the July 1, 1991 Settlement Agreement and Compliance Plan (the Compliance Plan) for Summitville Mine, a two volume BMP plan dated October 31, 1991 was developed. The Compliance Plan required that the BMP provide a reclamation plan and implementation schedule that included existing and planned pollution prevention practices. The BMP also evaluated the need for long term treatment of storm water drainage at the facility.

The BMP was designed to minimize or control contact between precipitation and potential sources of pollutants. The BMP developed at the Summitville Minesite included housekeeping, employee training, inspections, preventative maintenance. In addition, reclamation activities such as grading, stabilization, revegetation, erosion control and sediment control were included as part of the BMP. Each of the measures was designed to protect the existing water quality and quantity during the operation phase and upon closure of the Summitville Mine.

The existing BMP plan which is currently being implemented at the Site and will continue to be implemented regardless of which alternative is selected, attains compliance with the NPDES stormwater and categorical point source standards.

1.5.3.2 Action Specific ARARs

Colorado Mined Land Reclamation Act

The Colorado Mined Land Reclamation (MLR) regulations at 2 CCR 407-1 require the reclamation of mined areas. The MLR regulations provide specific reclamation criteria which are applicable to the Summitville Minesite. As a previously disturbed area, at a minimum the MLR regulations require reclamation to a pre-mining condition.

The conditions imposed by the Colorado MLR Permit #M-84-157 for the Summitville Mine stipulated a phased approach to land reclamation which minimizes the total disturbed area at any point in time. When mining activities in each area have been completed and the sections no longer are needed, the permit requires that all land associated with waste dumps, leach heaps, roads, mine pits and plant facilities be reclaimed for forage and timber use. Pursuant to CRS 30-20-102(4) a certificate of designation for solid waste disposal is not necessary for the Site because the Site has been issued Permit #M-84-157. CRS 30-20-102(4) states:

> "...any person who is engaged in mining operations pursuant to a permit issued by the mined land reclamation board or office of mined land reclamation which contains an approved plan of reclamation may dispose of solid wastes generated by such operations within the permitted area for such operations. For the purpose of this part 1, such solid wastes disposal site and facility shall be an approved site for which obtaining a certificate of designation under the provisions of section 30-20-105 shall be unnecessary."

Reclamation activities at the Summitville Minesite will emphasize Surface soil stabilization (to include grading, top soil management, and revegetation), preservation of water quantity and quality, and concern for the safety and protection of wildlife.

Clean Air Act

Federal and state ARARs were identified for construction and generation of particulate matter (PM10) at the Site. An emission permit will be required if temporary construction activities exceed more than two years (See 5 CCR 1001, §3(I)(B)(3)(e).) Control measures to minimize dust and air monitoring will be implemented if necessary during remedial construction activities. Regulation 1 of the Colorado Air Pollution Control Regulations requires all sources of particulate emissions to utilize technically feasible and economically reasonable control measures. This requirement is applicable to remedial activities that produce fugitive particulate emissions at the Site.

An air pollution permit was applied for at Summitville Minesite for the emission of hydrogen cyanide as a stationary source. The permit included a description of the cyanide leach heap pad process at the Summitville Mine and all associated process chemistry. Permit # 92-RG-653 was given an exempt status in September of 1992. The Summitville Site claimed uncontrolled emissions of less than one ton per year and no emissions of hazardous, odorous or toxic pollutants and was therefore exempt (See 5 CCR Section 3(II)(C)(1)(j).) Thus, this particular requirement is not applicable or relevant and appropriate at the Site.

RCRA Subtitle C

- Identification and Listing of Hazardous Waste (40 CFR 261), Applicable Water treatment processes will generate potential residues from spent chemicals and sludges. These materials will be managed in accordance with these ARARs.

- Standards Applicable to Generators of Hazardous Wastes (40 CTR 262), Applicable Water treatment processes will generate potential residues from spent chemicals and sludges. These materials will be managed in accordance with these ARARs.

- Standards Applicable to Transporters of Hazardous Wastes (40 CFR 263), Applicable Water treatment processes will generate potential residues from spent chemicals and sludges. These materials will be managed in accordance with these ARARs, if sludges are transported off-site.

- Standards for Owners and Operators of Hazardous Waste Treatment, Storage and Disposal Facilities (40 CFR 264), Applicable Water treatment processes will generate potential residues from spent chemicals and sludges. These materials will be managed in accordance with these ARARs.

- Hazardous Materials Transportation Act, D.O.T Hazardous Materials Transportation Regulations (49 CFR 171-180), Applicable

Any process chemicals or sludges generated by water treatment operations transported off-site will be transported in accordance with this ARAR.

1.5.3.3 Location Specific ARARs

Endangered Species

The Endangered Species Act requires that federal agencies ensure that federal actions will not jeopardize the continued existence of any threatened or endangered species or impact critical habitat. In response, a Preliminary Natural Resource Survey will be performed to identify natural resources, habitat types, endangered or threatened species, and any potential adverse effects or injury to trust resources.

Protection of Floodplains and Wetlands

Executive Order No. 11988 and Executive Order No. 11990 require federal agencies to evaluate the potential adverse effects of proposed actions on Floodplains and Wetlands, respectively. Floodplains and wetlands potentially subject to adverse impacts from site remedial actions will be inventoried and considered during the analysis, selection and implementation of the remedy.

Clean Water Act - Dredge and Fill Requirements.

Section 404 of the Clean Water Act prohibits the discharge of dredged or fill material into navigable waters, including wetlands. The Section 404 requirements are applicable if any remedial action construction will involve dredge and fill activities.

Fish and Wildlife Coordination Act

The Fish and Wildlife Coordination Act serves to protect fish and wildlife when federal actions result in the control or structural modification to natural streams or water bodies. Federal agencies must develop measures to prevent, mitigate or compensate for project related losses of fish and wildlife. Specifically included are projects involving stream relocation and water diversion structures. If applicable, prior to modification of water bodies, the applicable regulations will be followed.

Colorado Wildlife Act

The act establishes the Colorado Wildlife Commission, provides for wildlife management and prohibits actions detrimental to wildlife. The act is applicable if wildlife observed at the Site would be adversely impacted by the implementation of the remedial action.

Wildlife Commission Regulations

Chapter 10 of the Colorado Wildlife Commission regulations 92 CCR 406-8, Chapter 100 designates and protects certain endangered or threatened species. The regulations are applicable if endangered or threatened species observed at the Site are adversely impacted by the implementation of the remedial action.

Floodplain Management

The Executive Order on Floodplain Management (No. 11988) and 40 CFR §6.302(b) and Appendix A requires federal agencies to evaluate the potential effects of actions they may take in a floodplain and to avoid, to the maximum extent possible, any adverse impacts associated with direct and indirect development in a floodplain. This requirement may be applicable if the remedial activities take place in a floodplain.

Wetlands Protection

Executive Order on Protection of Wetlands (No. 11990) and 40 CFR §6.302(b) and Appendix A requires federal agencies to evaluate the potential effects of actions they may take in wetlands, in order to minimize adverse impacts to wetlands. This requirement is applicable if the remedial activities take place in wetlands.

1.5 3.4 Guidance, Advisories or Criteria To-Be-Considered

Interim Guidance on Establishing Soil Lead Cleanup Levels at Superfund Sites, Considered

Neither federal or state chemical specific ARARs for soil contamination were identified for contaminants of concern at the Summitville Mine Site. A to-be-considered criteria was identified for soil lead contamination. Specifically, the "Interim Guidance on Establishing Soil Lead Cleanup Levels at Superfund Sites", September 1989, (Directive #99355.4-02) will be considered when final remedial action objectives and goals are framed.

Amendment to the Settlement Agreement of July 1, 1991, Considered

The Amended Settlement Agreement established the NCL under authorities from the Colorado Mined Land Reclamation Act, sections 34-32-101 to 127, C.R.S. (1984 & 1991 Supp.) and the Colorado Water Quality Control Act, subsections 25-8-101 to 703, C.R.S. (1989). These standards were believed to have been developed using a back calculation from segment 3b of the Alamosa River. The NCL were considered during the technology and alternative screening and analysis.

1.6 Summary of Site Risks

The Human Health and Ecological Risk Assessment for the IFS was conducted using relevant EPA guidance including the Risk Assessment Guidance for Suited (EPA, 1989) and the RCRA Facility Investigation (RFI) Guidance (EPA, 1989). This risk assessment was a screening level risk assessment intended to briefly examine risks associated with the HLP.

1.6.1 Screening Ecological Risk Assessment

A Screening Ecological Risk Assessment for the Summitville Minesite was prepared by EPA in April, 1993. The screening ecological risk assessment reviewed the no action alternative to determine if there is an imminent hazard to the Wightman Fork from the Site. Copper, zinc, and cyanide were chosen as the COPC for the assessment.

The assessment modeled, measured, and predicted concentrations and the loading of copper in Wightman Fork for three scenarios:

- April 1993 conditions (included treatment of HLP contained water and discharge from the Reynolds Adit);
- Cessation of water treatment activities; and
- Catastrophic release of water contained in the HLP that could result from an event such as a failure of Dike 1, the downgradient impoundment feature.

Effects of the contaminants on rainbow trout and brook trout were estimated by correlating acute toxicity levels of the contaminants with measured and predicted concentrations. The degree of metals toxicity for aquatic life as affected by the pH and hardness of water was described. Study results of copper concentrations that are toxic to trout at differing water hardnesses were included in the assessment to illustrate the variation of toxic copper concentrations with water hardness (the sum of calcium and magnesium concentration expressed in terms of equivalent calcium carbonate).

The screening ecological risk assessment recommended the following:

- Continuation of Site water treatment prior to discharge and reduction of metals loading into the stream in order to achieve the Site's NPDES permit levels;
- Reduction of the flow of contaminated ground water by plugging the adits for long-term metal loading reductions to the Wightman Fork;
- Conducting an ecological survey of Wight Fork to obtain Site specific information to document actual discharge impacts and document the recovery of Wightman Fork after remediation; and
- Completion of a baseline risk assessment because the review of the no action alternative produced an unacceptable risk, defined as exceeding the Low Observed Adverse Effect Level (LOAEL).

The screening ecological risk assessment predicts an imminent hazard to the environment and suggests that all appropriate response actions should be undertaken to prevent the adverse effects from continuing to take place. Water treatment is intended to prevent further environmental degradation, and achieve significant risk reduction.

1.6.2 Environmental Risk Assessment

1.6.2.1 Aquatic Receptors

In general, the potential risks to aquatic organisms posed by an untreated release from the French Drain are predicted to be immediate and pronounced. COPC in the French Drain exceed acute and chronic surface water goals by several orders of magnitude. Modeling predicts that concentrations of cyanide discharging from

Cropsy Creek remain acutely toxic until the confluence of the Wightman Fork with the Alamosa River. Furthermore, the concentrations of cyanide would remain at levels in excess of the Colorado TVS in the Alamosa River for some distance below Wightman Fork. The TVS are promulgated, risk based standards developed to protect aquatic life uses.

It is important to note that the Site's impact on pH alone may contribute to toxicity to aquatic organisms, as there is a limited range of pH levels tolerated by aquatic receptors.

Prior to treatment of the Chandler Adit, the Colorado TVS, ARARs in Segment 3b of the Alamosa River, were regularly exceeded for copper, zinc, aluminum, iron and manganese. These exceedences are especially problematic as the hardness-dependent Colorado TVS may underestimate the potential toxicity of metals in the acid drainage (low pH) environment below the HLP. Normally, toxicity is reduced as hardness is increased. However, an underlying assumption of the criteria is that alkalinity increases as hardness increases. This assumption holds for many natural waters, however, at the Summitville Minesite hardness is relatively high and alkalinity is low. Ranges of data collected by the USGS in 1993 at Station 45.4 from Segment 3b of the Alamosa River are as follows:

Flow Season	Analyte	Maximum	Mean	TVS
May-July	Dissolved Copper	2600.00µg/L	1084.22µg/L	30 µg/L
October-March	Dissolved Copper	780.00µg/L	780.00ug/L	30 ug/L
May-July	Dissolved Zinc	450.00µg/L	301.44µg/L	230 µg/L
October-March	Dissolved Zinc	437.00µg/L	437.00µg/L	230 µg/L

The Colorado Division of Wildlife, in comments on the proposed ambient water quality standard for the Site, found that a self-maintaining population of brook trout was present in the Alamosa river segment that extends from the confluence of the South Fork of the Alamosa to Summitville in 1987 (Colorado Division of Wildlife, 1993). The population appears to have been eliminated in the intervening years by contamination of the Alamosa River.

1.6.2.2 Terrestrial Wildlife

An untreated release from the French Drain would pose significant risks to bird and mammal populations. Based on the modeled concentrations, risks to terrestrial wildlife from acute and chronic exposures to cyanide would be high along Cropsy Creek and Wightman Fork. The potential for chronic exposure is mitigated by the unsuitable habitats surrounding these sites. The lack of suitable habitats makes regular use of these areas unlikely.

The other COPC that pose potential acute risks to bird and mammal species in Cropsy Creek include: cadmium, copper, and manganese. Risks from acute exposure in Wightman Fork are substantially lower, although the risks from chronic exposure in those areas with suitable habitat (i.e., natural, undisturbed habitats) may be present.

1.6.3 Human Health Risk Assessment

A baseline human health risk assessment (HHHR) will characterize the risks posed by the COPC at the Site. To evaluate current and future risks, EPA is planning to complete a quantitative human health risk assessment in 1995. The assessment for human exposure to COPC proceeds with the identification and characterization of likely exposure scenarios, identification and evaluation of exposure pathways, estimation of exposure concentrations, and quantification of chemical intakes.

1.6.3.1 Exposure Scenario

The potential for exposure is based on the existing Site conditions and potential future Site conditions. Groups assessed for potential exposure pathways include on-site workers, on-site residents, off-site residents, and intruders/trespassers. Presently, access to the Site is being controlled. Currently, on-site workers, trained under OSHA ZWOPER, are required to use personal protective equipment (PPE), and are routinely monitored; therefore, they are evaluated under a separate process. Since the Site is a historic mining district, on-site residents are not considered a viable exposed population currently or in the ritual. Off-site residents and potential off-site recreational receptors will require evaluation during a baseline risk assessment.

1.6.3.2 Exposure Pathways

An exposure pathway describes the route a chemical may take from the source to the exposed individual. A complete pathway consists of four elements: a source and mechanism of chemical release to the environment, an environmental transport medium, a point of potential human contact with contaminated medium, and an exposure route. The transport medium can be air, ground water, soil, surface water, etc. The route can be inhalation ingestion or dermal contact with the medium.

Evaluation of the potential pathways suggests that most exposure pathways at the Site are incomplete. Currently, the only pathway with sufficient data for assessment is surface water: There is insufficient sampling data available to determine whether soil, ground water, and/or air are expostare pathways.

1.7 Description of Alternatives

This section describes the alternatives retained for detailed analysis for this interim remedial action. A description of all options considered for water treatment can be found in the Water Treatment Focused Feasibility Study, Summitville Mine Superfund Site, Summitville, Colorado. The five alternatives retained for detailed analysis to be discussed in this IROD are the following:

Alternative #1	No Action;
Alternative #2	Continue treatment of French Drain (FD) Sump and CWP water/treat HLP water;
Alternative #3	Continue treatment of FD Sump and CWP water/Treat HLP water/Convert CDP and MRP to AMD treatment/Treat peak flow AMD in MRP;
Alternative #4	Continue treatment of FD Sump and CWP water/Treat HLP water/Convert CDP to AMD treatment/Shut down MRP/Use containment for peak flow AMD control; and
Alternative #5	Continue treatment of FD Sump and CWP water/Treat HLP water/Construct new AMD treatment plant/Shut down CDP, MRP, and CWTP.

It should be noted that Alternative #2 through Alternative #5 of the IROD correspond to Alternative #3 through Alternative #6 of the Water Treatment FFS, respectively. Alternative #2 in the FFS, Institutional Controls, was eliminated in the screening process. For further discussion of this alternative and other treatment methods eliminated in the screening process, refer to the Water Treatment FFS.

With the exception of the no action alternative, all of the alternatives are effective for removal of contaminants from waters affected by Site conditions. All of the treatment alternatives include utilization of technologies currently operating on-site and the continued use of existing treatment facilities, except for Alternative #5, continued treatment with new plant.

Alternative #3, continued treatment with AMD conversion, Alternative #4, continued treatment with AMD conversion and containment, and Alternative#5, continued treatment with new plant, include construction of an AMD collection and routing network.

Implementation of water treatment technologies will not interfere with current or future remediation activities on-site.

All of the alternatives, except the no action alternative, will reduce adverse effects on the environment through treatment of AMD and water containing cyanide.

Institutional controls, such as posted warning signs and restricted Site access, are currently in place on-site and will be maintained throughout remediation activities.

Removal of contaminants from solution will create a sludge rich in metal compounds. Sludge will be disposed off-site by transport or contained and isolated on-site. Construction of a sludge containment feature is included in Cropsy Phase II design. A study of metals remobilization by sludge contact with acidic water is necessary. At this time, sludge presents no additional concerns at the Site.

1.7.1 Alternative #1 No Action

Inclusion of a no action alternative is consistent with the NCP and is required under CERCLA and SARA. The purpose of the no action alternative is to provide a baseline against which other alternatives can be compared. The no action alternative is the cessation of current water treatment activity and sediment control on the Site. Existing treatment infrastructure would be mothballed (mothballing is done to ensure reactivation without excessive expense for replacement of equipment damaged by severe weather or other consequences of inactivity). Ditches and ponds used to control surface runoff and sediment would not be maintained. Access to the Site would not be restricted. Monitoring to record and evaluate contaminant transport effects on human health and the environment would continue. The capital costs for the no action alternative are $892,297. The annual treatment and assessment costs are $55,640. The present worth of annual treatment and assessment costs, based on 5 years at a 5% interest rate, are $240,892. The total capital and present value of annual treatment and assessment costs is $1,133,189.

1.7.2 Alternative #2 Continue treatment of French Drain Sump and CWP water/Treat HLP Water

Alternative #2 includes continued treatment of AMD water discharging from the Cropsy Waste Pile and treatment of French Drain Sump water in the CWTP. HLP water would be treated by the CDP/MRP as part of the HLP remediation. After completing cyanide treatment of water from the HLP, the CDP and MRP treatment plants would be shut down and mothballed. Treatment of CWP and French Drain water at the CWTP would continue until water quality in the associated streams meets remedial objectives. The capital costs for this alternative are $9,936,915. The annual treatment and assessment costs for 1995-99 are $55,640. The present worth of annual treatment and assessment costs, based on 4 years at a 5% interest rate, are $187,902. The total capital and present value of annual treatment and assessment costs are $10,123,807.

1.7.3 Alternative #3 Continue treatment of French Drain Sump and CWP water/Treat HLP water/Convert CDP and MRP to AMD treatment/Treat peak flow AMD in MRP.

Alternative #3 includes continued treatment of AMD water discharging from the Cropsy Waste Pile and treatment of French Drain Sump water in the CWTP. HLP water would be treated by the CDP/MRP as part of the HLP remediation. Treatment of CWP and French Drain water at the CWTP would continue until water quality in the associated streams meets with remedial objectives. After completing cyanide destruction of the HLP, the CDP and MRP treatment plants would be converted to treat AMD. The converted CDP would treat AMD, minimizing contaminant transport to the degree possible by its capacity, 500 gallons per minute (gpm). The MRP would shut down during the months when Site AMD volume can be treated by the CDP. The MRP would be recommissioned during peak flow periods (May - July) to treat contaminated water volume in excess of CDP capacity. Utilization of the MRP adds 400 gpm to the total treatment capacity. The capital costs for this alternative are $9,795,483. The annual treatment and assessment costs are $9,488,451 for 1995-96 and $6,398,767 for 1996-97. The present worth of annual of annual treatment and assessment costs, based on 4 years at a 5% interest rate, are $247411,683. The total capital and present value of annual treatment and assessment costs are $32.207,166.

1.74 Alternative #4 Continue treatment of French Drain Sump and CWP water/Treat HLP water/Convert CDP to AMD treatment/Shut down MRP/Use containment for peak flow AMD control.

Alternative #4 includes continued treatment of AMD water discharging from the Cropsy Waste Pile and treatment of French Drain Sump water in the CWTP. HLP water would be treated by the CDP/MRP as part of the HLP remediation. Treatment of CWP and French Drain water in the CWTP would continue until untreated water quality in the associated streams meets with remedial objectives. After completing cyanide destruction of the HLP, the CDP would be converted to treatment of AMD. The MRP would be shut down. During peak flow periods (May - July), contaminated water volume in excess of the converted CDP capacity would be contained to allow treatment in the CDP when possible. A containment structure(s) would be utilized or constructed which would constitute a surface impoundment(s) for runoff control of AMD waste. The location and capacity of the containment structure is discussed in Appendix D of the Water Treatment FFS. This waste would be stored for treatment at the existing CDP facility. Exact volumes and waste types would be dependent upon selected storage areas at the Site and amount of cyclical runoff. The capital costs for this alternative are $9,785,483. The annual treatment and assessment costs are $8,924,135 for 1995-96, $3,927,035 for 1996-97, $2,917,226 for 1997-98, and $2,901,618 for 1998-99. The present worth of annual treatment and assessment costs, based on 4 years at a 5% interest rate, are $15,469,208. The total capital and present value of annual treatment and assessment costs are $26,874,691.

1.7.5 Alternative #5 Continue treatment of French Drain Sump and CWP water/Treat NLP water/Construct new AMD treatment plant/Shut down the CDP, MRP, and CWTP

Alternative #5 includes continued treatment of AMD water discharging from the Cropsy Waste Pile and treatment of French Drain Sump water in the CWTP. HLP water would be treated by the CDP/MR as part of the HLP remediation. When cyanide destruction is no longer needed, the CDP, MRP and CWTP would be shut down. During the HLP remediation period, a new water treatment plant would be constructed. The plant would be designed to treat all selected AMD streams, in accordance with Site remedial action objectives. All AMD would be treated in the new plant. The capital costs for this alternative are $15,024,521. The annual treatment and assessment costs for 1995 are $5,834,452 and for each year following, the costs are 4,795,284. The present worth of annual treatment and assessment costs, based on 4 years at a 5% interest rate, are $17,136,689. The total capital and present value of annual treatment and assessment costs are $32,161,210.

1.8 Comparative Analysis of Alternatives

Provisions of the NCP require that a limited number of alternatives that represent viable alternatives be evaluated against nine criteria in 40 CFR 300.430(e) (9). The alternatives are evaluated against each of these criteria and then against each other to determine the preferred alternative. Table 9 presents a summary of this analysis.

1.8.1 Criteria 1: Overall Protection of Human Health and the Environment

The overall protection of human health and the environment criteria addresses whether or not the interim remedial action provides adequate protection and describes how risks posed through exposure pathways are eliminated, reduced, or controlled.

Alternative #1, the no action alternative, does not alleviate the threat to the environment. No action is the least effective alternative for protection of human health and the environment during interim remedial actions.

Alternative #2, continued treatment with no AMD conversion, allows continued metals loading to downstream waters, sustaining unacceptable risk to aquatic receptors. Risk to human health would continue at its present level until water quality improvements are complete. This alternative offers more protection than the no action alternative, but less protection than all other alternatives.

Alternative #3, continued treatment with AMD conversion, improves overall protection of human health and the environment through treatment of additional AMD after cyanide destruction is complete. Activation of the MRP during peak flow periods preserves this overall protection; however, without adding storage capacity or plant facilities release of contaminated water in excess on peak capacities is required while HLP water is being treated. Ground water and non-point source water continue to be potential contaminant contributors.

Alternative #3, continued treatment with AMD conversion, provides significantly more contaminant removal than Alternative #1, no action, and Alternative #2, continued treatment with no AMD conversion, but less than Alternative #4, continued treatment with AMD conversion and containment, and Alternative #5, continued treatment with a new plant. Peak flow in excess of 1,000 gpm would discharge untreated into Wightman Fork.

Alternative #4, continued treatment with AMD conversion and containment, improves the overall protection of human health and the environment through treatment of additional AMD after cyanide destruction is complete. Containment of surface water assures the maximum possible protection during interim remedial actions. Ground water and non-point source waters would continue to be contaminant contributors until identified and routed to treatment, if necessary.

Alternative #4, continued treatment with AMD conversion and containment, provides greater contaminant attenuation than Alternative #1, no action, Alternative #2, continued treatment with no AMD conversion, and Alternative #3, continued treatment with AMD conversion, and approximately the same amount as Alternative #5, continued treatment with a new plant.

Alternative #5, continued treatment with new plant, provides overall protection of human health and the environment through treatment of surface water. This alternative provides the same degree of protection as Alternative #4, continued treatment with AMD conversion and containment.

1.8.2 Criteria 2: Compliance with ARARs

Alternative #1, no action does not attain the chemical specific ambient water quality ARAR identified for Segment 3b of the Alamosa River. Alone, none of the alternatives will attain the chemical specific ambient water quality ARAR identified for Segment 3b of the Alamosa River. In conjunction with the other interim remedial actions, EPA has determined that only Alternatives 4 and 5 will attain the surface water quality ARARs at the point of compliance, Wightman Fork 5.5 (WF-5.5). Specifically, analysis within the Water Treatment FFS identified Alternative 3 as attaining the water quality ARAR 90% of the time based upon existing Site data. The remaining 10% represents untreated runoff from spring flow in 1995 without construction of the storage reservoir. Upon construction of the impoundment in the selected remedy, Alternative 4, EPA has assumed 100% compliance with the water quality ARAR at the point of compliance, WF-5.5. The attainment of this ARAR can be achieved through effluent quality at the point of discharge into the Wightman Fork. Because only clean upgradient water will be entering Wightman Fork prior to the water treatment effluent point, discharging effluent that meets the IAL should meet ARARs at the point of compliance. Additionally, the only discharge period from the plant would occur during high flow conditions; thus, there would be no degradation of water quality expected in the Wightman Fork due to the remedy. Additional water quality controls would be available through treatment of the Valley Center Drain and Cropsy Waste Pile runoff through the Cropsy Wastewater Treatment Plant, if required. The final treatment alternative was evaluated as to attainment of these standards based upon alternative development. The development of Alternative 5 envisioned the construction of a new waste water treatment plant "designed to treat all selected AMD streams, in accordance with Site remedial action objectives" (pg.64, Water Treatment FFS). By definition, this alternative would meet ARARs through designed treatment capacity.

All alternatives implement acceptable BMP for effluent limitations and stormwater management

All alternatives will attain the MLR reclamation requirements.

All alternatives will meet fugitive particulate emissions ARARs during implementation. The ARA will be attained through technically feasible and economically reasonable control measures.

All alternatives will meet the action-specific RCRA Subtitle C ARARs.

All alternatives will attain all location-specific ARARs.

1.8.3 Criteria 3: Long-term Effectiveness and Permanence

Long-term effectiveness and permanence refers to the ability of a remedy to provide reliable protection of human health and the environment over time. According to 40 CFR 300.430(e)(9)(iii)(C), factors that should be considered in assessing the long-term effectiveness and permanence of a remedy include the magnitude of residual risk remaining from untreated waste or treatment residuals remaining at the conclusion of remedial activities; and the adequacy and reliability of controls such as containment systems and institutional controls that are necessary to manage treatment residuals and untreated waste.

It is anticipated that in the short-term, water treatment will be needed to meet water quality criteria. However, in the long-term, water treatment may not be needed due to the success of other remedial activities on-site. An evaluation will be performed in five years after this interim action is completed to assess the continued need for water treatment and the level of treatment required.

The no action alternative, Alternative #1, would not be successful in meeting any established RAOs or focused water treatment goals. The residuals would continue to severely impact the water quality on-Site and downstream from the Site. The no action controls at the Site are ineffective at containing contaminants. No action is the least effective alternative for preventing potential long-term effects of contaminant on downstream aquatic, agricultural, and domestic receptors.

Alternative #2, continued treatment with no AMD conversion, provides adequate containment and isolation of residual sludges produced by the operation of the treatment plants. Use of a properly designed and constructed disposal area is necessary. Proper maintenance of containment and capping of sludge as a final action will prevent metals remobilization through sludge contact with acidic waters. There may be additional measures that provide stability for sludge constituents. Since this alternative treats the least amount of water, it would leave the least amount of waste to be properly stabilized. The long-term effectiveness of Alternative #2 is greater than Alternative #1, no action, but less effective than all other alternatives.

Alternative #3, continued treatment with AMD conversion, provides adequate containment and isolation of residual sludges produced by the operation of the treatment plants. Use of a properly designed and constructed disposal area is necessary. Proper maintenance of the containment and the capping of sludge as a final action will prevent remobilization of metals by sludge contact with acidic waters. There may be additional measures that provide stability for sludge constituents. This alternative provides more permanent benefits than Alternatives #1, no action, and Alternative #2, continued treatment with no AMD conversion, but less permanent benefits than Alternative #4, continued treatment with AMD conversion and containment, and Alternative #5, continued treatment with a new plant.

Alternative #4, continued treatment with AMD conversion and containment, and Alternative #5, continued treatment with a new plant, provide the same degree of long-term protection of human health and the environment. Treatment of all AMD streams may result in greater residual sludge volume than provided by Alternative #1, no action, Alternative #2, continued treatment with no AMD conversion, and Alternative #3, continued treatment with AMD conversion.

1.8.4 Criteria 4: Reduction of Toxicity, Mobility, and Volume through Treatment

Reduction of toxicity, mobility, or volume through treatment refers to the preference for a remedy that reduces health hazards, the movement of contaminants, or the quantity of contaminants at the Site.

Treatment is not a component of Alternative #1, the no action alternative. There would not be a reduction of transported contaminant load to do re waters or a reduction in the quantity of contaminants.

Alternative #2, continued treatment with no AMD conversion, reduces the volume of transported contaminants through water treatment. Metals mobility in residual materials is low. Risks to the environment by the on-site disposal of sludges can be minimized by the proper construction and maintenance of containment/isolation features. Further study on sludge stability is needed. This alternative is the least effective treatment alternative for reducing total contaminant toxicity, mobility and volume.

Alternative #3, continued treatment with AMD conversion, reduces the volume of transported contaminants through water treatment. Metals mobility in residual materials is low. Risks posed to the environment by the on-site disposal of sludges can be minimized by the proper construction and maintenance of isolation and containment features and/or sludge stability enhancement. Recycling of some sludges may be practicable.

Alternative #3, continued treatment with AMD conversion, would discharge peak AMD flow in excess of 1,000 gpm untreated into Wightman Fork. Therefore, this alternative is more effective than treatment Alternative #2, continued treatment with no AMD conversion, but less effective in reducing transported metals load than Alternative #4, continued treatment with AMD conversion and containment, and Alternative #5, continued treatment with a new plant.

Alternative #4, continued treatment with AMD conversion and containment, and Alternative #5, continued treatment with a new plant, provide treatment of all contaminated point source discharges. The volume of transported contaminants is reduced through water treatment. Metals mobility in residual materials is low. These alternatives provide the same degree of contaminant removal. Alternative #4, continued treatment with AMD conversion and containment, and Alternative #5, continued treatment with a new plant, are more effective at reducing the movement of contaminants and the quantity of contaminants than all other alternatives.

1.8.5 Criteria 5: Short-term Effectiveness

Short-term effectiveness addresses the period of time needed to complete the remedy, and any adverse effects to human health and the environment that may be caused during the construction and implementation of the remedy.

Due to the remote location of the Site and the existing access restriction, no substantial risks to local communities or populations are anticipated by implementation of any of the alternatives. All alternatives pose the same primary risks to personnel working at the Site as those that currently exist. Measures implemented to minimize these risks are contained in the Site Health and Safety Plan.

Alternative #1, no action, adversely impacts water quality by the cessation of all treatment activities at the Site and the release of waste streams into the HLP. Large volumes of contaminants would migrate off-Site creating increased metal loading and reduction of pH in the drainage pathways. No action is the least effective alternative for reducing risk at or downstream from the Site.

There would be no significant additional impact to human health and the environment during implementation of Alternative #2, continued treatment with no AMD conversion. The short-term effectiveness of Alternative #2, continued treatment with no AMD conversion, is slightly higher than the effectiveness of Alternative #1, no action. However, when compared to the other alternatives, this alternative is the least effective, because AMD is not treated or contained.

There would not be significant additional impact to human health and the environment during implementation of Alternative #3, continued treatment with AMD conversion. Environmental impacts of Alternative #3, continued treatment with AMD conversion, caused by construction of a solution collection and routing system are considered to be minimal. This alternative is more effective in the short term than Alternative #1, no action and Alternative #2, continued treatment with no AMD conversion, but less effective than Alternative #4, continued treatment with AMD conversion and containment, and Alternative #5, continued treatment with a new plant.

Alternative #4, continued treatment with AMD conversion and containment, provides an immediate benefit through containment and treatment of all point sources of AMD. Metals removed would not degrade waters downstream from the Site. Environmental impacts, caused by construction of a solution collection and muting system, are considered to be minimal. The effects from potential construction of a containment feature would also not be significant. This alternative provides greater short-term effectiveness than any other alternative, but approximately the same amount as Alternative #5, continued treatment with a new plant.

Alternative #5, continued treatment with new plant, provides immediate benefits through the treatment of all point sources of AMD because it utilizes the existing treatment capabilities while the new plant is being constructed. Metals removed would not degrade water downstream from the Site. Environmental impacts for Alternative #5, continued treatment with new plant, caused by construction of a new water treatment plant are considered to be minimal. This alternative provides the same short-term effectiveness as Alternative #4, continued treatment with AMD conversion and containment.

1.8.6 Criteria 6: Implementability

Implementability refers to the technical and administrative feasibility of a remedy. This includes the availability of materials and services to carry out a remedy. It also includes coordination of Federal State, and Local government efforts to remediate the Site.

Implementation of Alternative #1, the no action alternative, offers no implementability concerns since it is technically and administratively feasible.

Implementation of Alternative #2, continued treatment with no AMD conversion, involves only on-site activities; therefore, no additional administrative approvals or permits will be required. Materials and services required for implementation either presently exist or are readily available. Shutdown and mothballing of the CDP and MRP require conventional winterization measures. Alternative #2, continued treatment with no AMD conversion, is the easiest alternative to implement because all the required facilities are currently in use.

Implementation of Alternative #3, continued treatment with AMD conversion, involves only on-site activities. Therefore, no additional administrative approvals or permits will be required. Materials and services required for implementation either exist or axe available. Shutdown and mothballing of the MRP requires conventional winterization measures.

Since the CDP and MKP would be converted to treat AMD during peak flow, the implementability would be more difficult than Alternative #1, no action, and Alternative #2, continued treatment with no AMD conversion, but less difficult than Alternative #4, continued treatment with AMD conversion and containment, and Alternative #5, continued treatment with a new plant.

Alternative #4, continued treatment with AMD conversion and containment, is implementable. Selection of the area in which excess AMD is to be contained affects ease and timing of implementation. Implementation involves only on-site activities; therefore, no additional administrative approvals or permits will be required. Materials and services required for implementation either presently exist or are readily available.

Implementability of this alternative would be more difficult than Alternative #1, no action, Alternative #2, continued treatment with no AMD conversion, and Alternative #3, continued treatment with AMD conversion, but not as difficult as Alternative #5, continued treatment with a new plant.

Alternative #5, continued treatment with a new plant, is implementable. Location of a new plant will be affected by other remedial actions. Implementation involves only on-site activities; therefore, no additional administrative approvals or permits will be required. Materials and services required for implementation either presently exist-or are readily available. Alternative #5, continued treatment with a new plant, is the most difficult alternative to implement since it requires building a new plant.

1.8.7 Criteria 7: Cost

Cost evaluates the estimated capital, treatment and assessment costs of each alternative in comparison to other equally protective alternatives.

Alternative #1, no action, is the least expensive alternative, but it is also the least effective. Capitol costs associated with this option include shutting down and closing the Site water treatment plants, Site support, and demobilization of equipment Annual treatment and assessment costs directly associated with implementing this alternative include monitoring containment effects. Monitoring costs associated with downstream pollution mitigation and/or supplemental soil additives in agricultural impact areas cannot be estimated at this time. The cost detail is shown in Table 10.

Estimates of expected costs are:

Capital Costs:	$892,297
Annual Treatment and Assessment Costs:	$55,640
Present Worth of Annual Monitoring Costs:	$240,892
Total Capital and present value monitoring costs:	$1,133,189

(Present Worth cost for 5 years at 5% interest rate.)

Capital costs for Alternative #2, continued treatment with no AMD conversion, include draining of the HLP, shutdown of the CDP and MRP, Site support, and equipment demobilization Assessment costs include monitoring of contamination after 1994. The cost detail is shown in Table 11.

Alternative #2, continued treatment with no AMD conversion, costs more than the no action alternative and less than the other retained alternatives.

Estimates of expected costs are:

Capital Costs:	$9,936,915
Annual Treatment and Assessment Costs:	
1995-99	$55,640
Present Worth of Annual treatment and assessment Costs:	$187,902
Total Capital and present value of treatment and assessment costs:	$10,123,817

(Present Worth cost for 4 years at 5% interest rate.)

Capital costs for Alternative #3, continued treatment with AMD conversion, include expenditures for HLP leachate treatment, Site support, MRP shutdown, and equipment demobilization. Annual treatment and assessment costs include AMD treatment, reactivation/shutdown of the MRP and Site support. The cost detail is shown in Table 12.

This is the most costly alternative, evaluated.

Estimates of expected costs are:

Capital Costs:	$9,795,483
Annual Treatment and Assessment Costs:	
1995-96	$9,488,451
1996-97	$6,398,767
Present Worth of Annual treatment and assessment Costs:	$24,411,683
Total Capital and present value of treatment and assessment costs:	$32,207,166

(Present Worth cost for 4 years at 5% interest rate.)

Capital costs for Alternative #4, continued treatment with AMD conversion and containment, include expenditures for HLP leachate treatment, Site support, MRP shutdown, rerouting of effluent, and equipment demobilization. The annual treatment and assessment cost estimate is for AMD treatment and Site support Costs anticipate polluted water volume reduction resulting from other remedial actions. The cost detail is shown in Table 13.

The cost of this alternative is greater than Alternative #1, no action, and Alternative #2, continued treatment with no AMD conversion. The cost of Alternative #4 is significantly less than Alternative #3, because the containment structures reduce the cost of water treatment by eliminating the need for water treatment during the winter months and by treating at capacity during high flow (which is more cost effective). The cost of Alternative #4 is also significantly less than the cost of building a new treatment plant (Alternative #5).

Estimates of expected costs are:

Capital Costs:	$9,785,483
Capital cost for constructed storage/containment:	$1,610,000

Annual Treatment and Assessment Costs:

1995-96	$8,924,135
1996-97	$3,927,035
1997-98	$2,917,226
1998-99	$2,019,618

Present Worth of Annual Treatment and Assessment Costs:	$15,469,208
Total Capital and present value of treatment and assessment Costs with constructed storage option:	$26,874,691

(Present Worth cost for 4 years at 5% interest rate.)

Capital costs for Alternative #5, continued treatment with a new plant, include HLP leachate treatment, Site support, shutdown of existing plants and demobilization. Annual treatment and assessment cost estimate is for water treatment and Site support. The cost detail is shown in Table 14.

Costs are comparable to the costs of Alternative #3, continued treatment with AMD conversion, but greater than all other alternatives.

Estimates of expected costs are:

Capital Costs:	$15,024,521

Annual Treatment and Assessment Costs:

1995	$5,834,452
1996-99 (ea.)	$4,795,284

Present Worth of Annual Treatment and Assessment Costs:	$17,136,689
Total Capital and present value of treatment and assessment costs:	$32,161,210

(Present Worth cost for 4 years at 5% interest rate.)

1.8.8 Criteria State Acceptance

State acceptance describes whether the State agrees with, opposes, or has no comment on the preferred alternative.

The State concurs in the selection of Alternative #4, as the interim remedial action.

1.8.9 Criteria 9: Community Acceptance

Community acceptance includes determining which components of the alternatives interested people in the community support, have reservations about, or oppose.

The community concerns regarding water treatment include the lack of significant water treatment until 1996, concerns that the water quality standards in Wightman Fork and Alamosa River may not be met, the disposal of the residual sludge, and statutory compliance with ARARs.

The community responses to the alternatives are presented in the Responsiveness Summary, Section 3.0. The Responsiveness Summary addresses comments received during the public comment period.

1.9 The Selected Alternative

Based on the comparative analysis of the nine criteria, Alternative #4 (continued treatment with AMD conversion and containment) is the selected remedy for the water treatment interim remedial action.

The major components of the selected interim alternative include:

- Continued treatment of the CWP drainage and the French Drain waters in the CWTP.
- Destruction of cyanide in the water from the HLP will continue in the CDP/MRP until the water quality meets remedial action objectives.
- Completion of HLP remediation, followed by the conversion of the CDP to treat AMD. The MRP would be closed and would remain on-Site as a contingency facility.
- Containment of AMD in the area of the SDI/BMD during peak surface water flows that exceed CDP capacity (500 gallons per minute). The contained water would be treated before being released into Wightman Fork during Interim Remedial Action.

Implementing this interim remedial action will achieve protection of human health and the environment. The RAOs and goals for this interim action are:

- Compatibility with sitewide RAOs;
- Reduction of contaminated water impacts to the aquatic receptors in the Wightman Fork, the Alamosa River, and the Terrace Reservoir during interim remedial activities;
- Flexibility in the treatment of varied volumes and chemical makeup of the water requiring treatment;
- Minimization of water treatment costs;
- Minimization of treatment waste products and waste disposal requirements; and
- Realization of practical resource recovery to lower overall treatment and Site remediation costs.

Alternative #4 was chosen as the selected remedy based on the following:

- This alternative provides overall protection of human health and the environment.
- This alternative may not initially attain ARARs, but is eligible for an ARARs waiver because it does not exacerbate Site problems and is consistent with the expected sitewide final remediation goals. ARARS will be met with final remedial action(s) for the Site.
- This alternative provides long-term effectiveness by reducing the contaminant load to downstream waters.
- This alternative reduces the volume and mobility transported contaminants and metals through water treatment.
- This alternative provides immediate short term benefits through containment and treatment of all point sources of AMD. By implementing this alternative, Wightman Fork would not be degraded by the release of contaminated water during seasonal peak flows.
- This alternative is easily implemented because it involves only on-Site activities. Additional technical or administrative permits are not required.
- This alternative is the least expensive alternative relative to the benefits it provides.

This interim remedy is consistent with current or future activities to complete sitewide remediation on goals.

1.10 Statutory Determinations

The selected remedy meets the statutory requirements of Section 121 of CERCLA as amended by SARA. These statutory requirements include protection of human health and the environment, compliance with ARARs, cost effectiveness, utilization of permanent solutions and alternative treatment technologies to the maximum extent practicable, and preference for treatment as a principal element. The manner in which these requirements are met utilizing the selected remedy is presented in the following discussion.

1.10.1 Protection of Human Health and the Environment

This interim action protects human health and the environment from the threat being addressed and the contaminated water being treated.

This remedy includes the use of on-site containment of AMD flows that may exceed the treatment capabilities of the plants during the spring runoff. Constructed storage capacity in the area of the SDI/BMD will be utilized to control the untreated discharge of AMD into Wightman Fork during these peak flow periods.

Implementation of this remedy allows maximum reduction of surface water pollutant mobility and volume. Peak flow containment optimizes seasonal water management and these containment features may be used for long term attenuation of metals loading.

1.10.2 Compliance With ARARs

Under Section 121 (d)(1) of CERCLA, remedial actions must attain standards, requirements, limitations, or criteria that are applicable or "relevant and appropriate" under the circumstances of the release at the Site. This action will attain the IALs in effluent discharged upstream of the compliance point WF-5.5. Dependent upon stream flow and quality, this remedy will meet IALs at WF-5.5 and attain ARARs at monitoring point AR-45.4. This remedy will satisfy the ARAR requiring application of BMP to stormwater, and similarly will attain Mine Land Reclamation (MLR) reclamation requirements.

1.10.3 Cost Effectiveness

The selected remedy is cost-effective because it has been determined to provide overall effectiveness proportional to its costs, the net present worth value being $26,874,691. Treatment of AMD is a proven technology in the protection of human health and the environment.

1.10.4 Utilization of Permanent Solutions and Alternative Treatment Technologies or Resource Recovery Technologies to the Maximum Extent Practicable (MEP)

It has been determined that the selected remedy represents the maximum extent to which permanent solutions and treatment technologies can be utilized in a cost-effective manner to address the control of AMD at the Summitville Site. Of those alternatives that are protective of human health and the environment and comply with ARARs, it was determined that the selected remedy provides the best balance of trade-offs in terms of long-term effectiveness, reduction in mobility, or volume achieved through treatment, short-term effectiveness, implementability, and cost, while also considering the statutory preference for treatment as a principal element and considering state and community acceptance.

The selected remedy treats the principal threats posed by the possibility of AMD entering the surface water system. Water quality drainage from the Site is expected to improve as interim remedial actions are completed. This improvement, along with removal of cyanide and metals from water contained in the HLP, will result in decreased pollutant content in water feeding the Alamosa River and Terrace Reservoir.

With the application of water treatment technology, metals loading is rapidly reduced. Water treatment will progress towards achieving narrative and numerically derived remedial action objectives. After an evaluation of the capacity for contamination reduction to the Alamosa River and Terrace Reservoir by conditions at the Site, time required for implementation, capacity for response to changing conditions, and cost, this remedy is best suited to allow progress towards achieving interim RAOs.

1.10.5 Preference for Treatment as a Principal Element

This interim action does employ treatment as a principal element, and is therefore in furtherance of meeting this statutory requirement. Through a combination of cyanide destruction treatment of acidic-metal-laden waters and containment of AMD, the selected remedy addresses the principal threats posed by contaminated surface waters. Therefore, the statutory preference for remedies that employ treatment as a principal element is satisfied.

2.0 RESPONSIVENESS SUMMARY

This Responsiveness Summary was developed in accordance with the EPA guidance document, "Community Relations in Superfund: A Handbook" (EPA/540/R-92/009).

2.1 Responsiveness Summary Overview

As part of the public comment period, the U.S. Environmental Protection Agency (EPA) and the Colorado Department of Public Health and the Environment (CDPHE) identified their preferred alternative for water treatment at the Summitville Mine Superfund Site (Site) based on information provided in the Water Treatment Focused Feasibility Study (Water Treatment FFS). The preferred alternative addresses the interim remedy for treating acid mine drainage (AMD) originating from sources altered or disturbed during mining activities at the Site and water containing cyanide originating from the Heap Leach Pad (PILP). This alternative is presented in the Proposed Plan for Water Treatment issued by EPA in conjunction with the Water Treatment FFS.

The major components of the preferred alternative include:

- Continued treatment of the Cropsy Waste Pile (CWP) drainage and the French Drain waters in the Cropsy Water Treatment Plant (CWTP).
- Destruction of cyanide in the water from the HLP in the Cyanide Destruction Plant (CDP)/Metals Reduction Plant (MRP) until the water quality meets remedial action objectives.
- Completion of HLP remediation, followed by the conversion of the CDP to treat AMD. The MRP will be closed and will remain on-Site as a contingency facility.
- Containment of AMD during peak surface water flows that exceed the CDP capacity (500 gallons per minute). The contained water will be treated before being released into Wightman Fork.

Comments were received during the extended public comment period by interested parties in Summitville and the surrounding areas. The concerns regarding water treatment at the Site include the lack of significant AMD treatment until 1996, a concern that water quality standards in the Wightman Fork and Alamosa River may not be met, the nature of the CDP process, the disposal of the resulting sludge, high operating and maintenance costs, and statutory compliance with the NCP.

This Responsiveness Summary addresses all of the verbal comments received during the public meetings and all of the written comments submitted during the public comment period. Transcripts from the public meeting and written comments are available in the Administrative Record. Documents in the Administrative Record are available at the following locations:

Del Norte Public Library 790 Grand Avenue Del Norte, CO 81132 (719) 657-2633 Hours: Mon-Sat 1:00-5:00	Conejos County Agricultural and Soil Conservation Service Box 255 15 Spencer St. La Jara, CO 81140 (719) 589-6649 Hours: Mon-Fri 8:00-4:30	EPA Superfund Records Center 999 18th St., Suite 500 Denver, CO 80202-2405 (303) 294-1807 Hours: Mon.-Fri. 8:30-4:30

The comments are grouped according to the topic of concern. Therefore, issues or concerns that were duplicated will be addressed only once under the topic to which it pertains.

2.2 Response to Water Treatment Specific Comments

2.2.1 Summary and Response to Local and Community Concerns

This section summarizes and responds to the major issues and concerns raised by the local community. In this document, "local community" refers to individuals who live in the immediate vicinity of the Summitville Mine Superfund Site.

2.2.1.2 Water Treatment

Comment 1:
The treatment of AMD, using the preferred alternative, is inadequate. The preferred alternative can not begin significant treatment of acid mine drainage until 1996. Also, the CDP has a treatment capacity of only 600 gpm, which makes it inadequate for AMD treatment flows generated nearly 8 months out of the year. It would not be possible to treat other non-point sources until the completion of the collection/containment/

pumping feature in late 1996. Even then, flows in excess of 1,000 gpm would be discharged untreated to the Wightman Fork. How much water can be treated at one time and how long can it be treated?

Response:

The CDP has an estimated AMD treatment capacity of 500 gpm. The CDP, MRP, and CWTP combined have a treatment capacity of 1,000 gpm. The water treatment activities at the Site are targeted to treat point discharges of AMD flows from the Cropsy Waste Pile (CWP), Heap Leach Pad (French Drain Sump), Summitville Dam Impoundment (SDI), Beaver Mud Dump (BMD), and the underground workings. After the corrective action for Chandler adit plug, the Cropsy Phase II removal of CWP, BMD, and SDI, and detoxification of the Heap there is expected to be a continual decrease in flows of AMD and improvement in water quality.

The CDP, which is expected to have an AMD treatment capacity of 500 gpm, has been selected to treat the AMD while the MRP will be shut down. This decision is based on the fact that the MRP only will have an estimated AMD treatment capacity of 400 gpm and will require a more costly conversion than the CDP.

According to current construction schedules, the construction of the collection/containment/ pumping feature could be accomplished in 1995. This would ensure containment of all AMD over 500 gpm flows for 1996. Contained waters will be treated and discharged during low flow months.

Non-point source discharges, such as the contaminated surface run-off, are defined as contaminated surface flows. These non-point sources are mitigated through reclamation activities such as regrading, covering with top-soil, revegetation, and capping. The preferred alternative addresses these flows for treatment in the short-term through surface water control measures which direct the surface flows into the containment structure.

The treatment capacity of CDP is different for HLP leachate and AMD. The maximum treatment capacity is determined by the hydraulic capacity of treatment vessels and/or the maximum sludge handling capacity (as determined by sludge dewatering equipment).

The maximum hydraulic capacity of CDP is 800 gpm which applies to leachate treatment capacity. HLP leachate has (comparatively) low solids content and; therefore, sludge dewatering is not a problem.

The treatment capacity for AMD (very high solids content) is determined by sludge handling and clarification ability of the plant. This treatment capacity has been estimated as being 500 gpm based on current data from on-site AMD treatment.

Treatment Capacities of the three treatment plants for HLP leachate and AMD are as follows:

HLP Leachate Treatment:	
CDP and MRP Total:	800 gpm
AMD Treatment:	
CDP:	500 gpm
MRP:	400 gpm
CWTP:	100 gpm
Total Capacity: 1,000 gpm for AMD treatment	

Alternative #4 involves AMD treatment by the CDP and CWTP for a total treatment capacity of 600 gpm. Costs for the CWTP are included as part of the CWP FFS remedial action.

Comment 2:
The FFS did not mention what size plant they would build for Alternative #6 (IROD Alt. #5).

Response:
The treatment capacity estimated for Alternative #6 was a peak capacity of 2,000 gpm or 2.88 mgd. This plant would be able to treat all flows of AMD (based on historical data) without the need for surge capacity.

A group of commenters submitted a proposed water treatment plant (PWTP) to treat all acid mine drainage leaving the Site. The suggested method of treatment is lime precipitation. The PWTP would be located above the confluence of Wightman Fork with Cropsy Creek. The PWTP should be located below the SDI, so that it could take advantage of gravity flow and so it could treat all AMD on-site without incurring pumping costs. Proper placement of the PWTP will alleviate the need to pump water uphill for water treatment which would be necessary under the EPA's preferred alternative. By extending the 550 diversion ditch and constructing another ditch on the northeast side of the Site, it would be possible to catch all AMD generated on-site. Construction costs for these ditches are estimated to be $3 to $4 million.

Response:
The PWTP is essentially the same as Alternative #6 (IROD Alt. #5) and, therefore, it has the same limitations as Alternative #6. These limitations include the following:

- It costs approximately $5.3 million more than the preferred alternative;
- It has higher O&M costs because it must operate year round;
- It does not have excess storage capacity and must be designed to treat peak flow;
- It does not utilize the existing facilities; and
- It requires the construction of a new facility that would be demobilized in 4 years when the Site has been successfully remediated.

In addition, lime precipitation produces almost double the sludge which is produced using a hydroxide process.

Comment 4:
The SDI will be used for excess storage of runoff in the spring. Upon completion of water treatment, the pond can be converted to a constructed wetland. Because of the limited capacity of the existing treatment plants under the EPA's preferred alternative, the pond will not be able to hold excess water and will be constantly disturbed. The PWTP allows a stable water body in which development of the constructed wetland will be accelerated.

Response:
The comment indicates that at least one party may be confused about the need for constructing the containment structure. The structure will be built specifically to hold the excess AMD when the plant is in operation and to hold the contaminant flows that occur during the late fall, winter, and early spring months when the treatment plant is shut down. The containment structure will have a 100 million gallon storage capacity. This will enable the plant to operate at full capacity during the late spring, summer, and early fall to process the water which has collected in the structure during the winter months when the plant is not operating. The use of the structure for containment and a wetland are mutually exclusive. The wetland will be evaluated in the sitewide FS.

Comment 5:
The assumption of needing the CDP for further cyanide destruction is in conflict with the preferred alternative for the Heap Leach Pad, which proposes using bacteria for cyanide destruction.

Response:
No conflict exists. The CDP will be required for cyanide destruction treatment of the HLP leachate until the plans for biodetoxification of the Heap are complete and the Heap is dewatered. The Heap Leach Pad FFS proposes the detoxification of the ore using cyanide destroying bacteria; it does not propose treatment of leachate using bacteria.

Comment 6:
Is the hydrogen ion included in the list of metal removal? You are not going to treat for that?

Response:
No. Treatment parameters are not designed to reduce the hydrogen ion concentration in the effluent.

Comment 7:
The PWTP takes advantage of other remediation phases and uses site advantages efficiently. AMD treatment can be done while other remediation actions are in progress and other treatment plants can be salvaged and sold as soon as HLP bio-remediation is started.

Response:
The Proposed Water Treatment Plant (PWTP) does not utilize the existing facilities throughout the remediation process. As a result, the construction of a completely new facility is required which ultimately will incur greater capital and O&M costs than the preferred alternative. Considering the extreme weather conditions at the Site and its remote location, it would be necessary to build a new plant with some degree of structural integrity if it has to serve as the only operating facility at the Site; i.e. support facilities like office space, showers, lunch areas, maintenance areas, heavy equipment maintenance areas, etc. These structures would have to be located near the plant or in the same facility. Only a facility with these capabilities would allow the salvage of all other plants at the Site. It would not be possible to construct all of these facilities in a modular fashion to facilitate their movement from site to site.

The preferred alternative will convert the CDP to treat AMD in 1995 and the MRP will be shut down and held in reserve. When Site remediation is completed, the treatment facilities will be available for sale or salvage depending on their value and condition

Comment 8:
Several concerns were raised regarding the hydroxide sludges produced at the Site. It was pointed out that they tend to be unstable and are subject to the release of metals over a wide pH range. It also was noted that no study has been included in this FFS describing how different sludges react with AMD and precipitations. This is a concern because Site disposal of the sludge is contemplated.

The PWTP is suggested to be configured for sulfide precipitation. Because metal hydroxides can be easily leached from the sludge, disposal methods are more complicated and expensive than those for sulfide sludges. A process that produces more stable sulfide sludges, like the sludge produced at the would avoid the need to undertake future remedial actions caused due to inadequate interim action. Using the MRP, instead of the CDP, would be an obvious solution and the MR would not need extensive retrofitting to treat AMD. However, using the MRP was not one of the alternatives that was offered.

Response.
The hydroxide precipitation technology for AMD treatment is a conventional, industry accepted technology. The sludge generated by the water treatment processes are buffered alkaline, metal hydroxide sludges which will be disposed off-site as a resource recovery or placed in the South Pit. The South Pit is intended to be lined and capped to isolate the sludges and other contaminated wastes (such as tailings) from contact with acidic waters or incident precipitation. The stability of the sludges on-site will be studied further during final design.

The hydroxide sludge is buffered with alkali hydroxides which will prevent its dissolution when in contact with low pH waters such as precipitation. The solution to avoid remobilizing metals from the sludges is to prevent or reduce contact with AMD. This is done by enclosing the sludges with a cap having a very low permeability.

The essential difference between the hydroxide and sulfide treatment processes is that the sulfide precipitation process is a polishing step, and would be extremely expensive (reagent and sludge handling costs) if used as the primary metals removal process. Conventional industry design and operation of sulfide precipitation processes entail the initial removal of metals through hydroxide precipitation prior to sulfide precipitation

Even if AMD is treated through the MRP, the sulfide precipitation process would not be used. Based on existing data, the hydroxide precipitation process is sufficient to meet the water quality standards stated in this FFS for all streams except the streams coring the cyanide-copper complexes.

Hydroxide sludge also has the advantage of potential recycling opportunities.

Comment 9:
The current water treatment process is a closed loop. The only positive effect of on-going water treatment is the destruction of cyanide.

Response:
The current water treatment processes at the Site include treatment of HLP leachate in the CDP and MRP prior to discharge. Some of the treated leachate is recirculated to the HLP to rinse the ore because there is not a source of fresh water on-site to use for this purpose. The rinsing program is effective and has achieved a 90% reduction in both cyanide and copper concentrations in the leachate. The water treatment activities also involve treatment of French Drain waters and Cropsy Waste Pile waters in the CWTP.

Comment 10:
How well will the proposed impellers and bowls on the pumps hold up to acidic water?

Response:
Acid proof pumps such stainless steel or rubber lined pumps are commercially available and have considerable resistance to corrosion.

Comment 11:
The new proposed alternative can be actively treating at point and non-point sources of acid mine drainage a year earlier than the EPA's preferred alternative. Construction can be done and the plant can be operational nearly a year prior to the estimates for Alternative #5 (IROD Alt #4).

Response:
It is doubtful that a new treatment facility could be constructed and on line by the spring of 1995 one year ahead of the preferred alternative. In fact, the containment structure, identified in the preferred alternative, is anticipated to be in place by the end of 1995. This will enable AMD to be collected through the winter of 1995-1996 and treated in the spring of 1996.

Non-point source discharges, such as contaminated surface run-off, are defined as contaminated surface flows. These non-point sources are mitigated through reclamation activities such as regrading, covering with top-soft, revegetation, and capping. Short-term effectiveness will be mitigated by collection of selected surface water flow into the containment structure.

Comment 12:
The duration of water treatment by the PWTP is flexible and more effective in comparison to that of Alternative #5 (IROD Alt. #4), given the assumptions of that alternative.

Response:
Alternative #5 compensates for fluctuations in flow and water quality using a containment pond. Specifically, the concentration of the contaminants in water that will be held in the containment structure will be roughly an average of the high and low concentrations that enter the structure. Since contaminant levels in the containment structure will not fluctuate to a great degree, it will be easier to treat AMD using the preferred alternative. In addition, the treatment plant will be in operation only part of the year which will result in lower O&M costs for the preferred alternative. Therefore, Alternative #5 does offer flexibility and effectiveness.

Comment
If the PWTP is implemented, a water treatment plant will be place in the event of failure of any remedy. Failures could occur in capping, adit plugs, stabilization of Cropsy Waste Pile footprint, and unforseen circumstances.

Response:
During emergency response conditions associated with a failure, a single facility utilizing one treatment process may not be able to treat varying sources of contamination without extensive and time consuming modifications. However, the preferred alternative offers a benefit that is not realized with one treatment plant. The preferred alternative can store excess water for treatment and divert it to the necessary treatment plant.

Comment 14:
The water treatment plant should be the hub for integrating the four focused feasibility studies and for all remedial actions to meet the EPA's stated objectives.

Response:
All four activities must achieve common objectives set out in the FFSs. However, the water treatment plant is the focus of water treatment activities. Other remedial actions should be investigated, planned, designed, and implemented on their own merits. For example, operating the reclamation project through the water treatment plant would be inefficient and at best would add a layer of management that would increase costs and delay decision making.

Comment
The preferred alternative (Alternative #5)(IROD Alt. #4) does not accomplish any of the specific RAOs described at the beginning of this document. In contrast, the new PWTP will meet or exceed all the RAOs established for the site by the EPA.

Response:
EPA has identified a preferred alternative which will meet the KAOs and interim remedial action goals. Specifically, the preferred alternative accomplishes the RAOs set for the Site by:

- Reducing the total contaminant load entering Wightman Fork - specifically, by treating the AMD from the CWP, HLP, French Drain the SDI, the BMD;
- Treating AMD from the point sources listed above beginning in 1995, after the HLP is dewatered;
- Reducing and ultimately eliminating human health and adverse environmental effects downstream of the Site;
- Reducing the need for continued expenditures for water treatment at the Site by remediating sources such as the HLP; and
- Encouraging early action and acceleration of the Superfund process through the Emergency Response Removal Actions (ERRA) and Remedial Investigation/Feasibility Studies (RI/FS) activities which have taken place or are on-going.

Comment 16:
Is there any way to set up a treatment plant at the reservoir - before it flows down river any further? It would make sense to locate your water treatment unit(s) as far downgradient as possible, even if entails relocation of the existing facilities.

Response:
In order to minimize the surface water effects of the Summitville Site, it is prudent to locate the treatment facilities as close to the sources of contamination as possible. The preferred alternative does this efficiently for the least cost by utilizing the existing treatment facilities.

Comment 17:
Is it possible to treat nil the contaminated water at the Site while other areas of the Site are being remediated? With this solution, the people who live in the area and the people who have cattle and farmland in the area do not receive more contamination.

Response:
The EPA is presently treating AMD at the CWTP and cyanide and metal at the CDP and MRP the ERRA. The preferred alternative will treat AMD from the CWP, HLP (French Drain Sump), SDI, BMD, and the underground workings before the 1995 spring run-off period and it will have a new containment structure in place prior to the 1996 spring run off period. The cost of the preferred alternative is estimated to be $26.8 million, the lowest cost of the comprehensive Alternatives #4-#6 (IROD Alts. #3-#5). This treatment, in conjunction with the stated remedial activities is expected to improve water quality in Wightman Fork and will meet the existing water quality standards for Segment 3b of the Alamosa River.

Comment 18:
An evaluation of the 1993, Ecology and Environment (E&E) report on point and non-point sources of AMD reveals that a total of 1.6 million gpd of AMD flow occurs at Summitville during the spring runoff. Of which, 1.2 mgd is being discharged directly into Wightman Fork without treatment.

Response:
The evaluation performed by E&E was preliminary based on SCMCI's operational data. E&E's estimate of spring flows was actually less than 50% of the 1993 spring AMD flows (Table 3, FFS). However, since the report was issued, the EPA has made significant advances towards the mitigation of the point sources of AMD thereby reducing the amount of AMD which is generated at the Site. Some of the actions taken by the EPA are:

1. Plugging of the Reynolds and Chandler adits:

2. The plugging of the adits is expected to not only have the immediate effect of reducing the flows from the adits, but also a long team reduction of generation of acidic water underground by flooding the underground workings and reducing the available oxygen for the acid generation reaction.

2. Removal of the Cropsy Waste Pile for placement in the mine pits:

The Cropsy Waste Pile impounds surface waters behind the Heap and causes AMD to overflow the dike each spring. The AMD impounded at the CWP also contaminates the ground water underneath the Heap and; therefore, the waters in the French Drain Sump. More than three million yards have been removed from the CWP and placed in the mine pits. In the process, many of the seeps, which were contaminated by the sulfidic rock in the CWP, have been uncovered. These seeps will be isolated and monitored. It is anticipated that they will eventually (if not immediately) reach acceptable water quality and will not require any active treatment.

3. Removal of the BMD and the SDI is ongoing:

The BMD and the SDI have been documented as significant contributors of AMD to Wightman Fork (EE/CA, E& E, 1993). The Cropsy Phase II project has targeted the complete removal of the AMD generating waste rock and tailings from these two locations for placement in the mine pits. Therefore, these two sources of AMD are expected to be eliminated helping the Site to achieve the RAOs.

4. Filling up of the mine pits to reduce infiltration of precipitation into the ground water and contact of precipitation with high sulfide rock in the underground workings. This is also expected to reduce the generation of the AMD that has historically drained from the Reynolds adit.

2.2.1.2 Cost

This FFS is poorly researched in almost all areas and capital costs as well as O&M costs are substantially inaccurate. O&M costs of this alternative are very high and require an unnecessarily large amount of personnel to construct and operate. Year round Site access and maintenance will be required for several years under this alternative and these costs are not included in the estimates for this alternative.

Specifically, the computation of capital costs and O&M costs for Alternatives 5 & 6 (IROD Alt. #4&#5) are inaccurate in several ways: 1) they do not take into account retrofitting of the CDP nor the containment required for the hydroxide sludges; 2) the O&M of Alternative 5 and their associated costs are questionable; 3) Alternative 6 requires a plant at the bottom of the site, is superior to Alternative 5, and achieves the water quality set by the RAOs. The capital costs for alternative 6 have been grossly overstated. Outside industry sources indicate that $1 to $1.50 per gallon treated should be used to calculate the costs for new, salvageable, plants. This would result in costs of $7.5 million for a treatment plant which is capable of treating 5 million gallons per day (gpd) (3,472 gpm). Even adding in $2.5 million for building it at Summitville, would still result in capital cost that are 55 million less than the costs listed for Alternative 6 in the FFS. Table 7 presents the current cost of HLP leachate at $9.70/1000 gallons. However, Tables 11 - 14 use $32.18/1000 gallons for HLP leachate treatment. Table 7 also presents the current cost of AMD treatment (no cyanide) at $9.30/1000 gallons. However, Tables 12 and 13 use $21.54/1000 gallons for AMD treatment (calculated based on the line item labeled "CDP Treatment Costs per week" and "CDP operation at 500 GPM"). These numbers are inconsistent.

Response:
The true cost of a new plant was established at between $4.5 and $5 million O&M costs are higher than those estimated by the commenter because the actual O&M costs include Site maintenance, drainage control, and security/access costs.

The capital costs and the O&M costs of each alternative have been extensively researched. The cost for Alternative #6 was based on a 2,000 gpm plant (approximately 3 mgd) that would effectively treat all the water at the Site that did not comply with the acceptable discharge requirements. The plant was scaled to treat the peak spring flow based on current and past site characterization data. In addition, the cost estimate assumes a reduction in treatment volume as reflected by a reduction in treatment costs for years 3, 4, and 5. Because there is no surge capacity factored into this option, the plant has to operate all year round to comply with remedial action goals for water quality in the Wightman Fork and Alamosa River.

Alternative #5 factors in a surge capacity of 100 million gallons which would be sufficient to hold all AMD flows through the late fall, winter and early spring. It is therefore assumed that the plant will only operate in spring and summer to treat and discharge all contained waters.

<u>O&M Costs</u>:

The cost of treating AMD through the CDP is based on historical cost data at the Site. The bare costs of treating AMD are tabulated in Table 7 (FFS). These costs were demonstrated to be competitive with plant O&M costs during evaluation of the various technologies submitted by 23 companies in response to the 120 request for proposals (RFP) sent out by the EPA. The treatment costs also included site maintenance costs, site drainage control costs, and security/site access costs.

The rationale for including these costs with Site maintenance is that when there is no water treatment activity at the Site, there is no reason to maintain Site access. Therefore, Site maintenance costs have not been factored into the other three FFSs. The Site maintenance costs are based on historical costs of EPA's operation on-site.

<u>Alternative #5 vs. Alternative #6</u>:

Alternative #5 and Alternative #6 are equally effective in meeting the water quality goals for the Site. In addition, Alternative #5, with its storage containment feature, provides a flexibility for design of other remedial activities a the Site in terms of maximum treatment capacities, variabilities in flows, ability to shut down in the winter months, etc. These options are not possible using Alternative #6.

<u>Capital Cost</u>:

The cost estimates for Alternative #6 in the Water Treatment FFS were calculated using conventional estimating techniques. The estimates were then cross referenced with the cost proposals submitted during the RFP process. The plant is sized to treat 2,000 gpm (approximately 3 mgd) during peak flows. Using the numbers provided in the comment above ($1.50/gpd), the cost for a new treatment plant would be $4.5 million. The Water Treatment FFS assumes a cost of $5.0 million.

One commenter has estimated that it will cost $10 million for the construction of the new facility. This estimate is very high in comparison to the EPA's preferred alternative cost of $5 million (Table 14, FFS) because the commenter estimated the flow rate at 5 mgd. If the commenter had used 3 mgd, the commenter would have arrived at $4.5 million, roughly the same figure as the EPA ($5 million). The EPA does not believe that a $2.5 million fudge factor needs to be included for construction at the Summitville location. Therefore, the commenters and the EPA's cost estimates to construct a new plant per Alternative #6 are essentially identical.

Treatment Costs:

The $9.70/1,000 gallons cost shown in Table 7 is for labor, utilities, and reagents only. The $32.18/1,000 gallons cost for HLP Leachate Treatment shown in Tables 11 - 14 includes the items above as well as the operation of the HLP, CDP, MRP, CWTP, the laboratory, the maintenance of these facilities, the handling of all sludge, and site support of Morrison-Knudsen's drilling and bio-remediation operations.

The cost of $21.54/1,000 gallons that the commenter calculated using the information in Tables 12 and 13 was calculated using assumptions that lack detail. No cost were presented to treat units of 1,000 gallons because the flow rates are variable and not all treatment facilities will be in operation during the entire year. It is likely that the flow rate will range from 500 gpm to as low as 200 gpm, while it is expected that the MRP will be in operation only during the months from May to July.

Comment 20:
To what degree of accuracy are the costs estimated?

Response:
The FFS is based on all currently existing site characterization data, operations data, and historical costs data. Capital costs and O&M costs in this FFS are in line with industry accepted estimates. According to OSWER Directive 9355.3-01 costs estimates must have a desired accuracy of +50 percent to -30 percent.

Comment 21:
Costs to retrofit the CDP to address the additional flow are not adequately computed in the Water Treatment FFS.

Response:
The following have been taken into consideration for converting the CDP to treat AMD:

- the cost of rerouting the effluent line to Wightman Fork; and
- the cost of installing a new pumping system from the storage pond to the CDP - this is factored into the cost of building the storage pond containment structure.

Comment 22:
Many established alternatives for water treatment were not given any consideration as alternatives. More efficient/cost effective possibilities were not given consideration as alternatives.

Response:
A comprehensive discussion of treatment alternatives is presented in Section 3.5 of the Water Treatment FFS. The EPA sent out a Request for Proposal (RFP) to all vendors for potential water treatment technologies. All responses to the RFP have been considered by the EPA for applicability at the site. All of these technologies were considered in developing the conceptual design for the treatment process for Alternative #6 (IROD Alt. #5), the new treatment plant. Capital and O&M costs in the cost estimates for Alternative #6 are comparable to those obtained in response to the RFP from the industry.

Comment 23:
Is there a possibility that if your interim action does not work, you're not only going to spend the $28 million on Alternative #5 (IROD Alt. #4), but you may find out you have to spend $30 million on Alternative #6 (IROD Alt. #5), any way?

Response:
Given EPA's present understanding of the Site, the preferred alternative addresses the RAOs better than any other alternative. If conditions at the Site radically change, it may be necessary to implement additional remedies which will increase the cost to remediate the Site.

Construction of a new treatment plant in not consistent with the Sitewide Remedial Action Objective "to reduce or eliminate the need for continued expenditures for water treatment at the Site." The preferred alternative, if successful, will meet this RAO by its progression from the elimination of water treatment during low flow periods to passive water treatment.

Comment 24:
There were several comments regarding the cost estimates for Alternative #5 (IROD Alt. #4) and Alternative #6 (IROD Alt. #5). The specific questions addressed the following issues:

a. The capital cost for the construction of a new plant in Alternative #6.
b. The O & M costs for both Alternative #5 and Alternative #6.
c. One comment specifically included two cost proposals for the construction of a water treatment plant and its operation.

Response:
The cost estimate for Alternative #6 was based on the concept of single water treatment plant at would be located at the lowest possible point at the Site where all contaminated flows would be channeled by gravity flow. This plant was sized for peak flows during spring run off which can be as high 2,000 gpm. During the winter months this plant will be treating continuous lower flows which could be as low as a 100 gpm.

The technology to be used at the plant was not finalized since this would be a decision for final design. However, all vendor technologies proposed in response to the RFP were considered for the purposes of conceptual design. Approximately 120 RFPs were sent out by EPA and 23 responses were received. Other industry accepted technologies were also considered and are discussed in Chapter 3 of the FFS.

The capital estimate for Alternative #6 (Table 14, FFS) was based on the following assumptions:

1. The leachate in the HLP will be treated until August 1995 when the Heap will be completely dewatered according the design of the bio-detoxification of the Heap. The cost of treating the leachate is included in the immediate capital costs for this alternative.

2. The new plant will be constructed at the Site between June and September of 1995 and will be ready for start up in late fall.

3. All other plants at the Site will be shut down and moth-balled at this time for future use or salvage.

4. The treatment plant will operate continuously, as a round-the-clock operation to prevent the discharge of any and all contaminated waters in order to ensure the water quality goals of this remedial action. This treatment flow rate will be low in the winter and maximum in the spring.

5. The rest of the site will be shut down when there is no other construction operation.

The cost estimate for the actual construction of the new plant was as follows:

Cost of constructing new plant:	$ 3.5 - 3.85 Million dollars (assumes that some equipment from the Site will be reused such as filter presses, laboratory equipment etc.)
Cost of rerouting pipelines and Utilities:	$ 350,000
Reconfiguring drainage and collection sump:	$ 300,000
Contingencies (10%):	$ 500,000
Total Estimated Cost of Facility:	$ 5,000.000

One set of comments included two cost proposals for construction and operation of a water treatment plant at the site.

The first proposal had been submitted to EPA during the RFP process. The proposal listed the capital costs for construction of a 1,000 gpm plant at $2.44 million. The proposer was contacted and provided a ball park revised estimate of $3.8 - 4.0 million for a 2,000 gpm plant. The plant was not portable or modular. The process being used was a variation of hydroxide precipitation using lime and soda ash. During the RFP review process, several of the reviewers felt that this process would increase the sludge volume generated by the treatment process.

The other proposal was also for the construction of a 2 mgd plant for $3.125 million. The proposer said that increasing the plant capacity to 3.0 mgd would raise the cost to approximately $ 4.0 million. This is in the same range as the EPA's estimate.

Neither of these proposals had support work like pipelines on-site, utility re-routes, or drainage reroutes costed.

O&M Costs:

The O&M costs for both Alternative #5 and Alternative #6 were based on cost proposals received from the industry as well as historical costs associated with treatment and site maintenance. The treatment basis for the costs is the following:

Peak flows: 2,000 gpm
Low flows: 100 gpm
Total Volume Treated in 1995-96: 265 million gallons
Total Metals (COC) Concentration in water: 2000 mg/L
Total Sludge produced in 95-96: 24 tons/day

The treated volume is assumed to reduce by 25 - 30 % each year for the four years of treatment.

The treatment costs contain all Site maintenance costs, Site security access maintenance costs etc. These treatment costs have been found to be historically accurate and take into account all the contingencies that could occur at a remote location such as Summitville, with extreme winter conditions.

The two proposals have very marginal discussion of O&M costs for water treatment. One proposal contains a cost of $ 1.40/pound of metals removed. This would translate to a cost of $6.2 million for the first year which is unreasonable.

The second proposal has been submitted by a company that has never visited the Site. The proposal lists the annual cost of operating the plant as $1.0 million. The proposed annual O&M costs of $1.0 million would not even account for the delivered cost of reagents for treating this volume of water. Based on the evaluation criteria used for screening technologies this proposal would have to-be considered-as non-responsive.

Comment 25:
What is the cost difference to build the storage capacity in comparison with building a new treatment plant?

Response:
The storage facility at the SDI is estimated to cost approximately $1.6 million. Whereas a new plant will cost between $4.5 and $5 million.

2.2.1.3 Water Quality

Comment 26:
The preferred alternative will not meet water quality criteria established by the State and will require official degradation of established stream standards.

Response:
Interim action levels for discharges from the water treatment plant are given on page 23 of the Water Treatment FFS. The IALs will be finalized upon EPA and State approval of the IROD. Water that is not treated under the preferred alternative prior to 1996 may or may not meet IALs. After 1996, the AMD coming from the point sources listed in the Water Treatment FFS will be collected and treated to meet the Site discharge requirements.

The existing water treatment plants at the Site are expected to meet the water quality standards as specified in the IALs in Section 1.4.1.5.4 of the FFS for all treated waters. Minor plant modifications may be necessary to accommodate changing Site conditions which result from other source containment actions (i.e., HLP, CWP, and Reclamation). EPA believes that this fact increases the short-term effectiveness of this alternative.

Comment 27:
The PWTP would meet or exceed water quality criteria established by the State without having to degrade the Stream Standards.

Response:
The preferred alternative will meet or exceed water quality standards. IALs for discharges from the water treatment plant are given on page 23 of the Water Treatment FFS. These interim action levels will finalized upon EPA and CDPHE approval of the IROD. The discharges are expected to meet existing standards. Water that is not treated under the preferred alternative prior to 1996 may or may not meet the IALs. After 1996, the AMD from the CDP, HLP and French Drain Sump, SDI, BMD, and the underground working point sources will be collected and treated to meet the Site discharge requirements.

Comment 28:
The Water Treatment FFS does not clearly identify the numerical standards by which discharges from the water treatment systems at the Site are being managed. These numerical standards should be defined and consistently used when evaluating and selecting any remedial action.

Response:
A discussion of potential interim action levels can be found in Section 1.4. 1.5.4 Calculated Interim Action Levels on pages 22 and 23 of the FFS. Once the IROD is signed by EPA and CDPHE, these values will be the

surface water standards for the Site at monitoring point WF-5.5, located at the confluence of Cropsy Creek and Wightman Fork. By achieving these discharge standards, the Site will be meet the ARARs discussed in Appendix C of the FFS and Section 2.8.2 of this document.

Comment 29:
The selection of a monitoring point for site discharges at mile 45.4 on the Alamosa River, rather than on the Wightman Fork at mile 5.5 fails to take into consideration the negative impact on water quality from non-site related sources.

Response:
The model, used to calculate the Potential Interim Remedial Action Levels listed in Section 1.4.1.5.4 (pages 22 and 23) of the Water Treatment EFS, incorporated a dilution factor in the formula that accounted for additional surface water flows between monitoring points WF-5.5 and AR-45.4. Any change in contaminant concentrations between the two monitoring points can be attributed to contaminant loading downstream of WF-5.5 and above 45.4.

Comment
When did the State of Colorado classify the stream segments? Was if before the Galactic phase of Summitville or after?

Response:
The streams were classified in 1985. Galactic applied for its permit in 1984.

Comment 31:
What environment are we protecting - that which existed before man set foot in the canyon or an environment that exists only in the planners' minds of a pristine mountain stream filled with trout and rocks unstained by mineral deposits?

Response:
The emergency response removal action was performed in order to stabilize the aftermath of the most recent mining actions at the Site and as the initial step to protect human health and the environment as defined by the RAOs set for the Site. In order to achieve the RAOs, the Site will undergo remediation to mitigate the effects of the most recent mining activities. Remediation will affect some of the historic activities as well.

Comment 32:
Is the agricultural quality water that we strive for, water that meets standards set forth in some EPA manual or is it the acidic water that has been used for nearly a century to make the agriculture region more productive and to help neutralize the alkaline, salt laden ground water which eventually gets to the Rio Grande?

Response:
It is neither. The surface water quality standards set by the State Water Quality Commission for this segment of the Alamosa River are the standards EPA is trying to meet. The water that is discharged from the Site is expected to meet the IALs contained in the FFS and are expected to meet the existing down stream surface water quality standards at monitoring points WF-5.5 and AR 45.4 located at the confluence of Cropsy Creek and Wightman Fork and Wightman Fork and the Alamosa River, respectively. Studies are underway to assure that the stream standards are classified appropriately. If these studies indicate that the stream classifications are not set properly, the State WQCC may reclassify them according to established procedures.

Comment 33:
If the absorptive capacity of the Terrace has been filled up, basically, by contaminants coming off Summitville, will you be looking at that, and will you be considering action to cleaning that particular problem up, if it exists?

Response:
The U.S. Geological Survey, EPA, and Morrison Knudsen Engineers are conducting studies to characterize Terrace Reservoir. No further actions are planned at this time.

2.2.1.4 Other Issues

Comment 34:
The Water Treatment FFS should discuss how Stream C flows are addressed by the interim remedial actions and describe in detail the planned "corrective measures" for the Chandler Adit.

Response:
Section 1.4.1.3, Description of Impacted Water, (pages 14 and 15) presents a detailed description of Stream C and the drainage from the underground workings via the Reynolds and Chandler adits. As stated in Section 2.2, Adit Plugging, the discharge from the Reynolds Adit declined to less than 10 gpm after the actit was plugged. The water quality of Stream C did improve for a period of time. However, plugging the Reynolds Adit resulted in an elevated water table which caused the Chandler Adit plug to fail. As a result, it will not be possible to achieve the Segment 3b water quality standards until the Chandler Adit is plugged. According to the Action Memo, the corrective measures planned are considered part of the Emergency Removal Response Action (ERRA) and are beyond the scope of this document. However, a work plan is currently underway and will be available to the public in the future. For more information regarding the Reynolds and Chandler adits, refer to the Reynolds Adit Control Program prepared by Environmental Chemical Corporation (ECC) in October 1994.

Comments 35:
No on-site contractor will be needed to oversee the PWTP since operators can be hired by the State or by the construction company.

Response:
EPA does not support this position. Due to the remote location of the Site, an on-site operator is required. It would take too long for off-site personnel to respond to spills, equipment malfunctions, and natural events such as snow storms. During the hours or days it would take for off-site personnel to reach the Site, enormous environmental damage could occur.

An on-site contractor would also be required to provide Site support services such as security, road maintenance, Site maintenance, Site drainage control, Site monitoring, etc., even with the construction of the PWTP.

Alternative #5 (IROD Alt. #4) visualizes a complete shut down of the Site through the winter which would, in realty eliminate all contractors from the Site for a significant part of the year. The Site would only re-open during construction season or in early spring:

Comment 36:
The company that authored this FFS has no experience in the areas of water treatment plant design and construction.

Response:
Environmental Chemical Corporation (ECC) is one of several nationally recognized companies that has completed or currently is completing work at the Site. All of these companies have submitted statements of their qualifications to the federal government. All companies that prepare feasibility studies are required to follow OSWER Directive 9355.3-01, Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA (Interim Final, October 1988). The cost estimates used to prepare each alternative contained in this FFS were based on proposals submitted by 23 companies in response to 120 requests for proposal sent out by the EPA.

Comment 37:
Can you clarify what ECC did and didn't prepare? Was it ECC that recommended a preferred alternative?

Response:
ECC prepared the Draft Water Treatment Focused Feasibility Study. Identification of the preferred alternative was determined by the Summitville Technical Team (STT). The STT is comprised of experts in the field including personnel from the EPA, the United States Bureau of Reclamation (USBR), CDPHE, Morrison Knudsen Engineers, as well as other organizations.

Comment 38:
EPA has spent over $40,000,000 on Summitville to date and will spend an additional 598,000,000. What are we going to get in return for our $140,000,000? Who is going to benefit and in what way? Has there been a cost-benefit analysis done, and if so, how many dollars of benefit are we going to get for each dollar expended?

Response:
EPA attempts to recover money from the potentially responsible parties (PRP). However, when this is not possible, the Superfund pays for the clean-up. EPA does not do a cost - benefit analysis to determine whether it is appropriate to clean up a site. EPA is required by Congress to clean up sites where hazardous substances present a risk to human health and the environment. EPA is fulfilling this requirement at the Summitville Site.

Comment 39:
How long is "long-term"?

Response:
This is a term which generally refers to the duration of a remediation process or the life of the remediation project. The Water Treatment FFS defines long-term as over five years.

What is the danger to human health from Summitville? I am concerned about what the continued use of this contaminated water will eventually do, not only to the land, drinking water from wells, but also to the livestock and products which are ultimately consumed by the general public.

Response:
The ERRA conducted at the Site was implemented in order to protect human health and the environment by reducing the risk of a catastrophic release of cyanide and metals as well as the release of AMD to the Site. EPA's prompt action and its continued operation of the Site facilities has enabled the EPA to initiate a remedial action program that will help attain the RAOs for the Site. A Risk Assessment (RA) is being conducted by Morrison Knudsen Engineers as part of this process. Studies such as this RA will enable the EPA to determine the impact on human health and the environment since the implementation of emergency response actions at the Site.

2.2.3   Comprehensive Response to Specific Legal and Technical Questions

Comment 41:
When discussing the stream sections where ARARs applied, why do you only look upstream from Terrace? Is downstream from the Terrace considered?

Response:
Water quality standards that are considered applicable or relevant and appropriate requirements for a site are ARARs. However, not all water quality standards for segments of the Alamosa River and its tributaries are ARARs for the Summitville Site. Identifying ARARs for the Site is not so much a process of looking upstream from Terrace Reservoir, but the process of identifying water quality standards downstream of the Site that represent the minimum water quality that is acceptable based on the classification and uses of the surface water for a specific segment of the Alamosa River.

At present, segment 3b, from immediately above the confidence of the Alamosa River with Wightman Fork to the inlet of Terrace Reservoir, has the most stringent water quality standards immediately downstream of the Site. Therefore, the segment 3b aquatic life cold water quality standards are ARARs which have been utilized to calculate the IALs, for the Site. Consequently, the water quality standards for Terrace Reservoir and the segments downstream of the reservoir are not considered ARARs.

Comment 42:
Several commentors are concerned that all four of the FFSs contain a statement that none of these interim actions "is anticipated to produce and immediate reduction in contaminated water flows." This was interpreted as a "disclaimer" that would potentially justify "letting out Remedial Contracts worth nearly 64 million dollars". In addition, this "disclaimer" allows EPA employees to avoid accountability, and in cases where these remedial actions are not effective, this statement is in direct conflict whit the published RAOs set by EPA.

Response:
The remedial actions in the four FFS's are designed to address various sources of contaminated waters at the Site in order to achieve a reduction in the generation of contaminated waters (Remedial Action Goals). The Water Treatment FFS is designed to treat the contaminated waters in the interim period while these long-term remedial actions are being implemented and are taking effect. The effect of this interim remedial action is anticipated to be the first step forward compliance with the RAOs.

The Water Treatment FFS doesn't clearly identify the standards to be achieved in the discharges from the water treatment systems. The specific interim numerical standards being applied to discharges from the Site should have been defined and consistently used when evaluating and selecting an interim remedial action.

Response:
The interim action levels (IAL) for water quality given on page 23 of the Water Treatment FFS are the standards used for the Site. The current Site operations meet the levels established for the indicator compounds in effluent standards. These indicator compounds, copper and cyanide, are selected due to their similarity in chemical process technology to the other compounds listed in the interim action levels. The IALs will be formally included into the Site record and when the IRODs are approved and signed by the CDPHE and EPA. Compliance with the IALs will enable the Site to meet the Segment 3b standards which are ARARs for

the Site.

The Water Treatment FFS based the evaluation and selection of the interim remedial action on the IAL. In 40 CFR 300.430(e)(2)(i), EPA is directed to develop remediation goals for the Site that are "protective of human health and the environment". The consideration for the development of these standards include:-1)." Applicable or Relevant and Appropriate Requirements (ARARs) under federal environmental or state environmental or facility siting laws"; 2) Water quality criteria under Section 303 and 304 of the Clean Water Act; and, 3) Environmental evaluations. The Code of Federal Regulations continues in sub-paragraphs (ii) and (iii) to require the EPA to identify and evaluate potentially suitable technologies and assemble these technologies into alternative remedial actions.

The Water Treatment FFS follows the CERCLA guidance document for conducting Remedial Investigations and Feasibility Studies, OSWER 9355.3-01, in utilizing these standards to evaluate the suitable technologies and assemble them into alternatives. These technologies are fast evaluated for implementability (OSWER- Section 4.2.5) and, if implementable, further evaluated as process options for effectiveness, implementability and cost. The NCL and IAL were significant considerations in the evaluation of these options for effectiveness (see pages 43-56, Water Treatment FFS). Additionally, the effectiveness evaluation was used to screen the technologies once they were assembled into alternatives (pages 60-64). Once the screening process was completed, the Code of Federal Regulations specifies a detailed analysis of alternatives to be performed {40 CFR 300.430(e)(9)(iii)(B)}. The detailed analysis includes a section regarding compliance. Each of the alternatives was evaluated for this criteria (see Chapter Five, pp. 66-79, Water Treatment FFS). Specifically, the Water Treatment FFS states on page 71, page 74 and page 77 for Alternatives #4, #5 and #6, respectively-

> "The ARARs associated with this alternative will pertain to chemical specific requirements for water quality as expressed by stream use classifications and associated numerical criteria."

The numerical criteria used in this report are the Numerical Criteria Limits (NCL) established by the CDPHE with SCMCI and the IAL recently developed by Morrison Knudsen Engineers. Each of the alternatives were evaluated as to attainment of these standards based upon alternative development. Based upon existing Site data, Alternative #4 is estimated to attain this ARAR 90% of the time without containment. The technology and alternative analysis for the preferred alternative shows that implementing the containment option would prevent the release of non-compliant water by the use of the storage capacity. Water contained will be treated and released once the technology-based treatment system is able to reduce contaminants to acceptable levels attaining ARARs 100% of the time. The development of Alternative #6 (IROD Alt. #5) includes the construction of a new waste water treatment plant "designed to treat all selected AMD streams, in accordance with Site remedial action objectives" (pg.64, Water Treatment FFS). By definition, this alternative would meet ARARs through designed treatment capacity.

Further definition of the interim numerical standards has been provided by, the Colorado Mining Association (CMA) in the recently published Conceptual Restoration Program. On page 4-11 the CMA writes;

> "Revision of the water quality standards and/or classifications are necessary to revise NCLs or permit effluent limitations. Both the NCLs and the effluent limitations provided in the CDPS permit for the water treatment facility are determined using a mass balance equation utilizing Alamosa River water quality standards. Also, the water quality standards would, under most circumstances may (sic) be considered ARARs for purposes of a cleanup performed pursuant to CERCLA."
>
> "Water quality standards for the relevant segment of the Alamosa River (Rio grande Basin segment 3b) would be used for determining the NCLs or permit effluent limits."

The CMA also comments within the same document:

> "If the NCL concept is utilized as part of the clean-up of the Site, the NCLs may need robe recomputed. The NCLs reportedly were based on CDPS methodology for water quality based effluent limitations and were calculated using the conventional mass balance calculation. Alamosa River flows, background concentrations, and water quality standards were believed to be used in the mass balance equation (Golder, 1992). However, since the NCLs were calculated the Rio Grande Basin has been resegmented, reclassified and different water quality standards have been assigned to the relevant portions of the Alamosa River and the Wightman Fork. Some of the standards have become stricter than at the time the NCLs were calculated while others are much less stringent (e.g. silver)."

While EPA does not necessarily agree that every relevant segment within the Rio Grande Basin has been revised, it concurs that the IALs should be established using this methodology. In fact, the EPA utilized this methodology to set the IALs (see pg 23, Water Treatment FFS). Since the IALs are based on the 3b surface water quality standards, the IALs are considered to be the water quality standards for the water treatment discharges at WF-5.5, the Site compliance point.

Comment 44:
Given the expenditures required to maintain the existing Site water treatment processes, the Water Treatment FFS is incorrect in the conclusion that effective water treatment facilities exist on-site and the need for capital investment for water treatment facilities does not exist. Sufficient development of alternatives was not performed for the alternatives screening and several alternatives presented in Section 3.0 merit further development. The Water Treatment FFS implies that current treatment facilities meets the Colorado Discharge Permit Standards. However, monitoring is performed for only two indicator metals, while EPA has conveniently ignored the other parameters that were difficult or virtually impossible for prior miners to meet. Therefore, the Water Treatment FFS must be considered incomplete.

Response;
One commentor suggested that the Water Treatment FFS is incomplete because the effectiveness of the existing water treatment systems is inconclusive. As stated earlier, the success of the existing systems is deemed sufficient to warrant favorable dispensation from EPA in an effectiveness analysis. The commenter also states that it is unfair to hold prior miners responsible for treatment parameters different than standards currently being met by EPA. EPA is under the same substantive requirements as the former operators. These standards are identified in the ARARs section of the Water Treatmere FFS. EPA has made significant improvements in attaining these standards. Upon formal signing of the IROD for Water Treatment, these standards, as set forth in the IALs, will become treatment goals for this interim remedial action. Finally, EPA finds that the use of the IALs did not preclude the analysis of potentially labor or cost reducing processes at the Site. Because all technologies were evaluated using the same criteria, all technologies were analyzed within the Water Treatment FFS using the potential for metals recovery and subsequent O&M impacts.

Comment 45:
Without establishing ARARs, EPA eliminated the use of biomass and ultrafiltration, more effective alternatives, since its existing practices are essentially "good enough" for now. Electroplating was eliminated because the currently used technology does not produce a concentrated liquid waste stream. The Water Treatment FFS should have considered the possibility of modifying current treatment processes so there would be a concentrated liquid waste stream acceptable for electroplating and metals recovery.

Response:
Similarly, another commenter noted that biomass, electroplating, and ultrafiltration were eliminated without establishing ARA and therefore were eliminated without a standardized effectiveness evaluation. It is important to note that two of these technologies, biomass and ultrafiltration, were defined in the Water Treatment FFS as polishing steps. The third technology, electroplating, would require substantial capital investment and realignment of process technologies to implement at the Site. Consequently, EPA did not consider these technologies effective based upon the apparent marginal, additional treatment effectiveness resulting from significant development and implementation costs. As discussed earlier, EPA has identified ARARs in Section 3.2 and Appendix C of the Water Treatment FFS. All technologies and alternatives were evaluated using these standards. As a matter of procedure EPA does not "establish" ARARs; rather, EPA is required to meet or waive the existing ARARs at the Site. The CMA has provided EPA with the industry perspective on the procedures used to "establish" ARARs at the Site in Section 4.4.2, Restoration Goals, CMA Conceptual Restoration Program. While EPA does not endorse or support the CMA proposal to revisit the ARAR standards, it emphasizes the fact that the EPA CERCLA remedy selection process is quite different than the establishment of ARARs.

Comment 46:
The Water Treatment FFS implies that interim remedial measures that do not fully meet interim water quality numerical standards may be acceptable provided the ARARS waiver provision is applied. The waiver of ARARs provision or its use in this instance is not adequately addressed relative to its potential impact on the selection of a preferred alternative and the final remedy.

Response:
The Water Treatment FFS does not imply that a waiver under 40 CFR 300.430(f)(1)(ii)(c) will be sought or granted pursuant to the selection of this remedy. EPA believes that the preferred alternative meets the IALs and, therefore, is compliant with the ARARs at this Site.

The section of the Water Treatment FFS that apparently caused confusion evaluates the different alternatives based on the nine criteria in the EPA RI/FFS guidance document Compliance with ARARs is one of the nine criteria. EPA included the waiver applicability analysis as part of this evaluation and does not intend to exercise this process with this remedy.

Comment 47;
The concentrations of the majority of the COC identified by the EPA are not presented in the report. Also, cleanup standards for these contaminants are not clearly identified. It is difficult to determine ff any of the evaluated alternatives are effectively remediating the COC.

Response:
Page 28 of the Water Treatment FFS states "Copper and cyanide were targeted Contaminants of Potential Concern (COPC) for monitoring and control during Emergency Response water treatment actions. These chemicals were the COPC with the highest concentration in residual process water and AMD from disturbed areas." During the transition from an Emergency Response Removal Action (ERKA) to a Remedial Action the Data Quality Objectives of the sampling and analysis program were primarily focused on water treatment process evaluations to further refine system effectiveness, to increase protectiveness to downstream receptors through higher quality water effluent, and to reduce treatment costs. Some wide spectrum analysis was initially performed by Ecology and Environment downstream of the Site. Currently, all of these COPC are being monitored as part of the Sitewide Remedial Investigation/Feasibility Study (RI/FS) being completed by Morrison Knudsen Engineers.

The technologies and alternatives were developed and evaluated using available industry process information, Site characteristics, ARA identification and other requirements for a Feasibility Study under CERCLA. The additional COPC were included in the evaluation inasmuch as the interim remedial goals, as expressed in the IALs, identified the contaminant as part of this interim remedial action. The COPC not covered in this analysis are currently being evaluated in the RI/FS. This is consistent with the CERCLA process. The results of the on-going RI/FS process will incorporate the environmental evaluations of the other COPC. If, at that time, the COPC are not considered a threat or potential threat to public health or the environment (42 USC 9604), then the COPC will be deleted from the final ROD for the Site.

EPA will not incorporate the COPC as chemicals to be treated on-Site without support to identify the threat as defined by the CERCLA statute. EPA feels that this would be a misuse of Fund money and; therefore, did not include the parameters which were not clearly identified in the chemical-specific ARARs. This discussion in the Water Treatment FFS can be found on page 23.

Additionally, EPA believes that the five year interim period of water treatment specifically identified in the Water Treatment FFS is consistent with possibly more stringent requirements which may be set in the final Site remedy and, therefore, is consistent with CERCLA. The proposed interim remedial action can be modified to treat additional contaminants, if necessary.

Comment 48:
Table 8 in the Water Treatment FFS lists technologies and process options that are going to be included as part of the detailed analysis of alternative. This table includes metabolic biological processes for cyanide destruction, carbon adsorption, and wetlands treatment. However, Section 5.0, Detailed Analysis of Alternatives, does not include detailed discussions of these alternatives.

Response:
Another commenter found Table 8 confusing in because it identified biological treatment for CN destruction, carbon adsorption and constructed wetlands for further evaluation yet these options did not appear to be included in the Detailed Analysis of Alternatives. EPA wishes to clarify this table. The biological treatment option was applicable to the Heap Leach Pad FFS and this analysis is found in that document Carbon adsorption was on-going at the time of Water Treatment FFS development. This technology was evaluated in Alternatives #4 and #5 as part of existing systems. The development of the constructed wetlands technology was incorporated into the Cropsy Waste Pile FFS due to the restoration of the footprint areas being directly associated with the removal actions under this operable unit. The detailed analysis of this technology can be found in this document

Comment
Interim water quality standards and the interim discharge monitoring point should be selected in conjunction with the potential water quality standards and discharge monitoring point for the final site remedy. Significant cost savings may be possible if the costs associated with interim remedial action objectives are applicable to the final remedy. Review of the detailed analysis of alternatives presented in the Water Treatment FFS indicates that the interim remedial action time frame extends up to the year 2000 with significant cost associated with the interim remedial action. In view of this, it is imperative that the Water Treatment FFS consider the potential requirements of the final remedy so that cost savings may be realized. For example, a new water treatment plant will likely be required for the final remedy since the existing water treatment processes may not be adequate with regard to design, operability, winterization, and flow rates. Therefore, continuing to operate the existing water treatment processes in lieu of constructing a state-of-the-art water treatment plant may, in the long run, not be a cost effective remedy.

Response:
The EPA established the IALs based upon ARARs for the Site. The IALs are water quality values which, if met, will assure that surface water flows from Wightman Fork will meet the Segment 3b water quality standards for the Alamosa River at monitoring point 45.4. The interim action period established by the EPA is five years. The IALs will be used to monitor the compliance with ARARs during this period. The interim water quality standards are a benchmark for measuring the success or failure of the interim remedial actions that take place on-site; they are a stepping stone to achieving the final RAOs. The NCP is clear about using fixed ARARs during the CERCLA process. In the February 6, 1990 Federal Register, Final NCP Rule, EPA writes on page 260:

> "Once a ROD is signed and a remedy chosen, EPA will not reopen that decision unless the new or modified requirement calls into question the protectiveness of the selected remedy. EPA believes that it is necessary to 'freeze ARARs' when the ROD is signed rather than at initiation of remedial action because continually changing remedies to accommodate new or modified requirements would, as several comments stated, disrupt CERCLA cleanups, whether the remedy is in design, construction, or in remedial action. Each of these stages represents significant time and financial investments in a particular remedy. For instance, the design of a remedy (treatment plant, landfill, etc.) is based on ARARs identified at the signing of the ROD. If ARARs were not frozen at this point, promulgation of a new or modified requirement could result in a reconsideration of the remedy and a re-start of the lengthy design process, even if protectiveness is not compromised. This lack of certainty could adversely affect the operation of the CERCLA program, would be inconsistent with Congress' mandate to expeditiously cleanup sites and could adversely affect PRP negotiations, as stated in several comments. The policy of freezing ARARs will help avoid constant interruption, re-evaluation, and re-design during implementation of selected remedies."
>
> "EPA believes that this policy is consistent with CERCLA section 121(d)(2)(A), which provides that `the remedial action selected...shall require, at the completion of the remedial action,' attainment of ARARs. EPA interprets this language as requiring attainment of ARARs identified at remedy selection (i.e., those identified in the ROD), not those that may come into existence by the completion of the remedy...Neither the explicit statutory language nor the legislative history supports a conclusion that a ROD may be subject to indefinite revision as a result of shifting requirements. Rather, given the need to ensure finality of remedy selection in order to achieve expeditious cleanup of sites, and given the length of time often required to design, negotiate and implement remedial actions, EPA believes that this is the most reasonable interpretation of the statute."

The discharge monitoring point WF-5.5 will remain the interim monitoring point for the Site and the IALs will remain the interim water quality standards during this remedial action five year period.

Additional comments were received regarding the use of existing facilities rather than building a new treatment plant at this time. The comments stated that building a new plant now would start the amortization process of the new plant costs. The underlying premise is that a new plant will eventually be required to meet ARARs, so it may as well be constructed now.

EPA's believes that a new plant will not be required unless Site source control actions (i.e., Reynolds Adit plugging, Cropsy Waste Pile Removal, Mine Pit Restoration, Heap Leach Pad Capping) are unsuccessful. Since these control measures are utilizing proven technologies in the mining industry, EPA is confident that ARARs compliance may indeed be achievable in five years without continuation of active water treatment.

The purpose of the comparison between Alternative #5(IROD Alt. g4) and Alternative #6 (TROD Air. #5) in the Water Treatment FFS is to evaluate these two options using CERCLA criteria. CERCLA criteria include cost analysis. Alternative evaluations can be found in Chapters Four and Five of the Water Treatment FFS, pp. 58-83.

EPA believes that once protectiveness is achieved at the Site through source control actions, the use of the existing water treatment facilities will become unnecessary. This is consistent with the fourth and fifth Remedial Action Objective established by EPA and listed on page 32 of the Water Treatment FFS, as follows:

- to reduce or eliminate the need for continued expenditures for water treatment at the Site; and
- to encourage early action and acceleration of the Superfund process.

The Colorado Mining Association wrote about this approach in the Conceptual Restoration Program recently submitted to the EPA. On page 4-2 in Work Element No. 2 of the proposed Site Management Implementation Program (SMIP) the CMA discusses optimizing the existing systems at the Site:

> "One goal of the SMIP is to optimize the performance of the water treatment systems that are in place. It is often more cost effective to improve the performance of an exiting treatment plant than it is to expend additional capital for a new one. This concept and philosophy has been adopted by EPA and their contractors. This is particularly true when the plant is expected to have a short operating life (and thus, a short`pay-back' period). At this time, it is premature to spend new capital for new water treatment systems without first having optimized the existing systems and without knowing the operating life of a new system."

The EPA concurs and has performed this analysis. Starting in December, 1992 EPA utilized Environmental Chemical Corporation, Weston, and Ecology and Environment to evaluate and optimize the existing water treatment systems. Additional support was provided by EPA Region VII Mine Waste Management and Water Quality personnel, CDPHE and Department of Natural Resources experts, and the EPA REAC Team from Deepwater, New Jersey and Cincinnati, Ohio. Immediate and significant changes were made to the water treatment processes as a result of the evaluation.

Additional support was requested from industry in March of 1993 through a Request for Proposal (RFP). The RFP was sent to 120 industry leaders in water treatment. The scope of the RFP was enhancement or improvement of water treatment operations at the Site. EPA received 23 responses some of which are currently being adopted. Other proposals are still under consideration.

For more information on water treatment processes, refer the to the EPA REAC Team Report compiled by Weston (February, 1993), the RFP by Environmental Chemical Corporation (March, 1993), the Task# 14 Report by Morrison Kaudsen Engineers February, 1994) and the Project Report for the USBR by ECC (July, 1994). These documents are available in the EPA Administrative Record, refer to Section 2.1 for locations. Currently, evaluation reports are being generated by Dames and Moore and Morrison Knudsen on further considerations for water treatment improvements.

Comment:
The Water Treatment FFS should describe the specific improvements that were made to the CDP and MRP. (Section 2.1)

Response:
Changes that were made to the CDP and MRP were done under the ERRA. The future modifications that will occur during the interim action will be discussed in the 90% design document.

Comment 51:
The Water Treatment FFS does not include process flow diagrams nor does it adequately describe the water treatment process being used at the CWTP, CDP, and the MRP. Also, it does not provide adequate detail regarding the interaction of the various water treatment plants and other Site facilities such as the French Drain Sump.

Response:
The Water Treatment FFS presented the targeted treatment streams in Chanter 3, pp.36-38. It is beyond the scope of the FFS to include Process Flow Diagrams (PFD). PFD are provided in the Administrative Record within Water Treatment FFS supporting documents. The Water Treatment FFS was prepared and reviewed by personnel with extensive knowledge about the on-going treatment processes at the Site. The Water Treatment FFS did incorporate the existing interactions between water treatment facilities in its development of alternatives. The comparison between Alternatives #4 and #5 (IROD Alts. #3 and #4) provides detail regarding the interaction of the water treatment plants. Alternative #4 utilities both the CDP and the MRP for the entire remedial action period. Alternative #5 eliminates the need for CDP and MRP interaction after HLP detoxification activities are completed. Thus, EPA has proposed the elimination of the MRP in late 1996. EPA and State evaluators with substantive Site process knowledge concur with this approach. Please refer to the alternative analysis sections of the Water Treatment FFS, pp. 32-81.

EPA directs the commenters to the RFP sent to industry in March 1993 by Environmental Chemical Corporation. This document contains detailed process descriptions as well as PFD. During this RFP process the proposers were given tours of the facilities wherein engineers were able to not only review comprehensive, full-scale PFD in great detail, but also were able to impact the processes at the Site. EPA still provides interested parties with Site tours.

Comment 52:
The Water Treatment ITS does not provide decision makers with sufficient information to adequately compare the possible alternatives. Additional information required includes clearly defined effluent standards, flow diagrams of the proposed alternatives, more thorough development of options that offer a true alternative to existing water treatment processes, more detail and support documentation of cost estimates, and more discussion justifying the preferred alternative.

Response:
EPA addresses the process of providing sufficient information to decision makers in the "Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA", OSWER Directive 9355.3-01, Section 4 and 6 as follows:

> "The FS may be viewed (for explanatory purposes) as occurring in three phases: the development of alternatives, the screening of alternatives, and the detailed analysis of alternatives....
>
> "Alternatives for remediation are developed by assembling combinations of technologies, and the media to which they would be applied into alternatives that address contamination on a sitewide or for an identified operable unit." (pg. 4-3)

The Water Treatment FFS presents the alternatives for water treatment in Section 3.4, General Response Actions and state:

> "General Response Actions are measures to satisfy the interim RAOs. The general response actions may be used alone or in combination to provide the most appropriate remedial action alternatives. The general response actions for consideration in meeting contaminant transport minimization or elimination consistent with remedial goals during Interim Remedial Action for water treatment are:
>
> - No Action
> - Institutional Controls
> - Containment
> - Active Treatment
> - Passive Treatment

The OSWER Directive continues...

> "Identify and screen the technologies applicable to each general response action to eliminate those that cannot be implemented technically at the site..."
>
> "Identify and evaluate technology process options to select a representative process for each technology type retained for consideration. Although specific processes are selected for alternative development and evaluation, these processes are intended to represent the broader range of processes within a general technology type." (pp 4-4 and 4-5)

The Water Treatment FFS addresses this requirement in Section 3.5, Identification of Water Treatment Process Technologies, pp 40-43. In this section the Water Treatment FFS evaluates oxidation, neutralization/precipitation, biological treatment, separation, electrochemical treatment, constructed wetlands, anoxic limestone drains, land application, sedimentation, and evaporation. Much of the data used to evaluate these technologies came from proposals from industry sources for the Summitville Site received in response to the March, 1993 RFP. The RFP presented a thorough and complete representation of existing and developing technologies. Where necessary, the RFP database was supplemented by literature and vendor source searches. The remainder of Section 3 presents the evaluation of the technologies which led to the development of the alternatives in the Water Treatment FFS.

The OSWER Directive continues...

> "Alternatives are defined during the development and screening phase (see Section 4) to match contaminated media with appropriate process options... However, the alternatives selected as the most promising may need to be better defined during the detailed analysis. Each alternative should be reviewed to determine if an additional definition is required to apply the evaluation criteria consistently and to develop order-of-magnitude cost estimates (i.e., having a desired accuracy of +5O percent to -30 percent)." (pg. 6-4)

The Water Treatment FFS provides these additional definitions in Section 4.3, Screening of Identified Alternatives (pgs.60-64). Further application of the nine CERCLA criteria for these alternatives is provided in Section 5.0 (pgs. 65-81). EPA has determined that the level of information provided to decision-makers is sufficient to meet these criteria and adequately justify selection of the preferred alternative.

Comment 53:
Alternative #6 includes construction of a new treatment plant; however, no details are provided regarding the proposed treatment process, plant capacity, or its location.

Response:
A commenter was concerned about the apparent lack of detail in describing the proposed treatment plant in Alternative #6. The Water-Treatment FFS describes the alternative in Section 4, page 64. EPA believes that for the purposes of the CERCLA level of design considerations (i.e., +50% and -30%) this description is sufficient to meet these parameters. EPA would like to explain to the commenter that this comparative cost analysis will be finalized for the selected remedy in the remedial design phase. Alternative #6 design considerations will be presented in following reports.

Several potential technologies were identified through the RFP process for application at the Site. All of these technologies would be considered for an actual design for the plant. The maximum plant capacity estimated for Alternative #6 is 2,000 gpm.

Comment 54:
Alternative #5 proposes annual operating costs that range from $7.20 to $34.00/1000 gallons. These costs are very high compared to typical costs for neutralization/precipitation using sodium hydroxide, which typically range from $1.50 to $2.50/1000 gallons. EPA must provide an explanation why Site costs for neutralization/ precipitation are so high.

EPA received additional comments regarding the adequacy of the cost presentation in the Water Treatment FFS. The cost analysis included capital costs inclusive of construction costs, equipment costs, land and site-development costs, building and services costs, engineering expenses, startup costs and shakedown costs, among others. Operating and Maintenance (O&M) costs in this analysis involved calculating operating labor costs, maintenance materials and labor costs, auxiliary materials and energy expenses, disposal of residues, purchased services, administrative costs, insurance, taxes, and licensing costs, maintenance reserve and contingency funds, rehabilitation costs, and costs of periodic site reviews. Further definitions of these costs categories can be found in OSWER Directive 9355.3-01, Guidance on Conducting Remedial Investigations and Feasibility Studies Under CERCLA, pp.6-11 and 6-12. Additionally, EPA believes that the placement of Site maintenance and support costs into the Water Treatment FFS interim remedial action is appropriate became the primary reason Site access is required during the long winter season is to continue water treatment activities.

One commenter requested clarification of process demobilization descriptions. EPA directs this commenter to Table 10, Cost Estimate for Alternative #1, Total Capital Costs. This section of the table identifies the specific mothballing activities, timeframe and costs.

Another commenter requested cost data on Site support activities as developed in the Water Treatment FFS to evaluate whether these numbers artificially skew the results to the preferred remedy. The Site support cost data for Alternative #4 was developed using actual numbers from on-going site activities. The Water Treatment FFS alternatives #1 and #3 include Site support costs substantially lower than the preferred alternative (see Tables 10,11, and 12). EPA directs this commenter to Ms. Laura Williams at (303) 293-1531 to obtain copies of monthly cost numbers.

Comment 55:
The Water Treatment FFS states that "the cost evaluation focuses on comparative estimates rather than specific and detailed analysis." Costs of the magnitude of Alternative #5 ($27 million) require specific and detailed analysis to justify the selection of the preferred alternative.

Response:
A commenter felt that the cost analysis provided in the Water Treatment FFS should not have been based upon "comparative estimates" due to the magnitude of cost associated with the preferred alternative. EPA believes that it is appropriate to use comparative analysis to evaluate the relative costs for alternative analysis. There are three separate cost analyses stages within the Water Treatment FFS. Initially, technology process option costs were compared in Section 3.0. This analysis is described on page 43 of the Water Treatment FFS:

> "Cost: Cost is considered during the initial screening of process options based on overall capital, labor, utility, and reagent estimates of cost rather than detailed engineering cost estimates."

The Water Treatment FFS further evaluates cost for developed alternatives in the Screening and Detailed Analysis of Alternatives, Sections 4 and 5, pp.60-81. The screening of alternatives in the Water Treatment FFS Section 4 did not use a detailed analysis of costs. The result of this preliminary screening was the elimination of Alternative #2, Institutional Controls. However, it is important to note that in the Detailed Analysis of Alternatives, Section 5, detailed, actual Site costs were used to develop a cost category estimate wherever possible. The third and final cost analysis occurs in the selection of remedy currently underway with the Proposed Plan for Water Treatment. In this step all of the nine criteria, including cost, are factored and balanced to evaluate the alternatives for an interim remedial action plan. The Final Rule of the NCP (February, 1990) discusses this process in greater detail on page 164:

> "Many commenters reflected some confusion over the role of cost as an analytical criterion under the detailed analysis and the required statutory finding that the remedy be cost-effective. One commenter focused on the need to distinguish the cost effectiveness finding from the cost evaluation criteria. EPA agrees that this distinction is an important one. Although cost is used as a crude screen in the development and screening of alternatives, cost is primarily addressed in the detailed analysis and remedy selection phases of the remedial process. The detailed analysis evaluates and compares the cost of the respective alternatives, but draws no conclusion as to the cost-effectiveness of the alternatives. Cost effectiveness is determined in the remedy selection phase, considering the long-term effectiveness and permanence afforded by the alternative, the extent to which the alternative reduces toxicity, mobility or volume of the hazardous substances through treatment, the short-term effectiveness of the alternative, and the alternative's cost..."

Comment 56:
The alternatives in Section 4.0 appear very similar. It appears that little or no effort has been made to identify any creative and/or innovative alternatives for further evaluation.

Response:
A commenter stated that the alternatives which were identified in the Water Treatment FFS did not include any creative or innovative alternatives for further evaluations. EPA wants to assure the commenter that creative and innovative technologies were evaluated in Section 3 of the Water Treatment FFS, specifically in the alternatives screening and development process. The inclusion of the biological treatment option in alternatives within the Heap Leach Pad FFS (see Table 8, Water Treatment FFS) is one result of this process. Development of constructed wetlands in the Cropsy Waste Pile FFS is another example of emerging technology applications at the Site. Inasmuch as EPA included technologies from the screening into the Alternatives Development step, EPA explains how innovative technologies are to be evaluated in the CERCLA process in the Final NCP Rule, pg 142:

> "EPA would like to clarify that it does not intend to inhibit the development of innovative technologies in the development and screening of alternatives. EPA has deleted the requirement in the final rule that innovative technologies must offer "better "performance than proven technologies. Instead, EPA has stated its intent to consider those innovative technologies that offer the potential for comparable or superior performance or implementability; fewer or lesser adverse impacts than other available approaches; or lower costs for similar levels of performance than demonstrated treatment technologies. By providing for the consideration of innovative technologies, EPA intends to eliminate from consideration only those innovative technologies that have little potential for performing well at specific sites.
>
> "As part of the encouragement of innovative technologies that EPA expects to result from this provision, EPA is emphasizing the need for performing treatability studies earlier in the remedial process."

EPA began treatability studies on biological treatment of detoxification of the Heap Leach Pad. Additional treatability studies have been performed on biocides, reagent substitutions, limestone, lime, lime kiln dust, and cement kiln dust. EPA has complied with the CERCLA requirement for innovative technology development and continues to support this development in Site operations.

Comment 57:
Alternative 3, 4, and 5 include the CWTP in the alternative description; however, the CWTP is not included in the costs of the alternatives.

Response:
One commenter was unable to locate the CWTP costs in the Water Treatment FFS. The CWTP costs are incorporated into the Cropsy Waste Pile FFS analysis. Please reference this document for this data.

Comment 58:
Insufficient backup is provided to perform a thorough review of the adequacy of the alternatives' cost estimate presented in Tables 10-14. For example:

- The Water Treatment FFS does not adequately define capital and O&M costs.
- Process demobilization needs to be described and backup information provided.
- All alternatives were developed assuming the same level of support.
- The costs associated with weekly monitoring seem excessive (i.e., $55,640.00/week).

- Cost estimates for Alternative 4, 5, and 6 do not include weekly monitoring.
- Each alternative includes costs associated with current Site operations and costs may artificially favor the status quo.

Response:
EPA received additional comments regarding the adequacy of the cost presentation in the Water Treatment FFS. The cost analysis included capital costs inclusive of construction costs, equipment costs, land and site-development costs, building and services costs, engineering expenses, startup costs and shakedown costs, among others. Operating and Maintenance (O&M) costs in this analysis involved calculating operating labor costs, maintenance materials and labor costs, auxiliary materials and energy expenses, disposal of residues, purchased services, drain ve costs, insurance, taxes, and licensing costs, maintenance reserve and contingency funds, rehabilitation costs, and costs of periodic site reviews. Further definitions of these costs categories can be found in OSWER Directive 9355.3-01. Guidance on Conducting Remedial Investigations and Feasibility Studies Under CERCLA, pp.6-11 and 6-12. Additionally, EPA believes that the placement of Site maintenance and support costs into the Water Treatment FFS interim remedial action is appropriate because the primary reason Site access is required during the long winter season is to continue water treatment activities.

One commenter requested clarification of process demobilization descriptions. EPA directs this commenter to Table 10, Cost Estimate for Alternative #1, Total Capital Costs. This section of the table identifies the specific mothballing activities, timeframe and costs.

Another commenter requested cost data on Site support activities as developed in the Water Treatment FFS to evaluate whether these numbers artificially skew the results to the preferred remedy. The Site support cost data for Alternative #4 was developed using actual numbers from on-going site activities. The Water Treatment FFS alternatives #1 and #3 include Site support costs substantially lower than the preferred alternative (see Tables 10, 11, and 12). EPA directs this commenter to Ms. Laura Williams at (303) 293-1531 to obtain copies of monthly cost numbers.

Comment 59:
It is not clear how Alternative #4 accounts for the increase in treatment capacity of the CDP and MRP from 600 gpm to 1000 gpm without significant capital expenditures to improve plant capacities or without significantly degrading treated effluent quality. Since current operation requires that both the CDP and MR be operated in series to meet discharge standards, the Water Treatment FFS should explain how discharge standards can be met with only the CDP in operation.

Response:
Several comments expressed concerns regarding the effectiveness evaluation of Alternative #4. Commenters questioned the ability of the CDP to reduce contaminant loadings in the discharge effluent to the Site standards and the ability of the containment feature to control peak flows. Additionally, one commenter addressed the cost and design considerations of the new containment feature. EPA believes that once the HLP is detoxified, the conversion of CDP would result in the highest treatment capacity available at the Site to treat the AMD water which is stored in the containment structure. Elimination of the MRP would be desirable due to its lower throughput capacity and overall higher operating cost per gallon of treated water. The CDP can be converted to AMD treatment once the requirement for cyanide treatment is eliminated through closure of the HLP. The Water Treatment FFS explains this premise on pages 62 and 63 in the alternatives description. The MPR adds approximately 400 gallons per minute of extra treatment capacity to the proposed AMD treatment system at a cost of over one half a million dollars per year or $2.5 million over the five year period (Table 12). EPA believes it is more effective to construct a containment structure (Appendix D) at a cost of $1.6 million (See page 76, Water Treatment FFS) than to continue using the MRP. The containment structure volume calculations are included in the structural descriptions. Cost factors for the storage containment feature did include estimates for new routing systems. The containment structure would have considerable advantages in that its long-term effectiveness and permanence would far exceed the interim remedial action period for the same mount of cost whereas the MRP would require continued expenditure of cash to maintain its long-term

effectiveness. Whereas, the use of the MRP would not be permanent.

Comment 60:
The interim remedial action objectives do not focus on quantified cleanup standards nor do they provide consideration for remedies that are highly reliable, cost effective, and protective of human health and environment. The study does not provide sufficient information to adequately compare the alternatives to support an informed risk management decision for selecting an Interim Record of Decision (IROD).

Response:
One commenter expressed confusion regarding the use of the Remedial Action Objectives and the Focused Water Treatment Remedial Goals as identified in the Water Treatment FFS (page 32). Specifically, the comment stated that the Interim RAOs (sic) do not focus on quantified cleanup levels nor do they support an informed risk management decision for selecting an IROD. EPA disagrees with this assertion. The sitewide activities include stabilization actions which remove the waste rock from the water. In the case of the CWP, this action has been very reliable in terms of risk reduction by isolating the AMD rock from seeps and springs within the Cropsy drainage basin. Likewise, the Interim Remedial Goals listed in the Water Treatment FFS include "reduction of contaminated water impacts to the aquatic receptors in the Wightman Fork, the Alamosa River and the Terrace Reservoir during interim remedial activities" (Water Treatment FFS, pg.33). As discussed earlier, this risk reduction criteria is based upon the ARARs (segment 3b of the Alamosa River) used to set the IALs. EPA believes that this process adheres closely to CERCLA and, thereby, provides criteria for consideration of remedies within the Water Treatment FFS that are highly reliable, cost effective and protective of human health and the environment. The Final NCP Rule promulgated in February of 1990 addresses this issue on page 138:

> "In fact, remediation objectives and goals are initially developed at the workplan stage, prior to commencement of RI/FS activities. In addition, the remediation goals are not necessary for the baseline risk assessment. Rather, the results of the baseline risk assessment are used to confirm that the preliminary remediation goals are indeed protective or to lead to the revision of the remediation goals in the proposed plan..
>
> "The remedial action objectives are the more general description of what the remedial action objective will accomplish.. Remediatian goals are a subset of remedial action objectives and consist of medium-specific or operable unit-specific chemical concentrations that are protective of human health and the environment and serve as goals for the remedial action.."
>
> "As noted above, the preliminary remediation goals are the more specific statements of the desired endpoint concentrations or risk levels. Initially, they are based on readily available information, such as chemical-specific ARARs (e.g., MCL, WQC) or concentrations associated with the reference doses or cancer potency factors... "
>
> "The development of preliminary remediation goals serves to focus the development of alternatives on remedial technologies that can achieve remedial goals, thereby limiting the number of alternatives to be considered in the detailed analysis. This focusing is one means of implementing the program's expectation for streamlining the remediation process. Information to develop final remediation goals is developed as part of the RI/FS process. Consequently, the use of preliminary remediation goals does not preclude the development and consideration or selection of alternatives that attain other risk levels. Final selection of the appropriate level of risk is made based on the balancing of criteria in the remedy selection step of the process."

Comment 61:
Alternative #4 (IROD Alt. #3) states that peak flows in excess of 1000 gpm would not be treated. The Water Treatment FFS should provide and estimate of the total quantity of water that would no be treated during a normal precipitation year. This information is necessary to assess the impact to water quality relative to Alternative #4 (IROD Alt. #3).

Response:
Several comments were received about the Alternative #4 evaluation. Alternative #4 would result in flows which exceeded 1,000 gallons per minute during peak flows being discharged to the Wightman Fork and that specific water quality data is necessary to evaluate Alternative #4. EPA concurs with the concern about untreated, discharged water in this alternative and wishes to point out that Alternative #4 did not maintain as high an effectiveness rating as Alternatives #5 and g6 (see page 71). It is estimated that Alternative #4 approaches ARARs (IALs) water quality "requirements 90% of the time" (see page 71, "Compliance with ARARs").

EPA has proposed Alternative #5 as the preferred remedy.

Comment 62:
The Water Treatment FFS should discuss how Stream C flows are addressed by the interim remedial actions and describe in detail, the planned "corrective measures" for the Chandler Adit.

Response:
The Chandler Adit (Stream C) is currently classified as an emergency Response Removal Action (ERRA) concurrent with action taken at the Reynolds Adit. It is beyond the scope of the Water Treatment FFS to address actions under ERRA. The focus of the Water Treatment FFS is Remedial Actions.

For specific information regarding the current status of the Reynolds Adit and the planned corrective actions for the Chandler Adit refer to the Reynolds Adit Control Program Report by ECC which was released at the Public Meeting on October 12, 1994. Copies of this report can be obtained from the EPA Administrative Record, refer to Section 2.1 for locations.

However, the Water Treatment FFS does present the data from the Stream C over the last few years. Table 1, FFS, shows the significant improvement in overall loading following the plugging of the Reynolds Adit, even with the subsequent release from the Chandler portal. Irrespective of the improvement in overall water quality, EPA intends to respond to the point source at the Chandler Actit with a corrective action to reduce or eliminate the flow of water from the portal.

Comment 63:
Given the large runoff volumes at the Site as well as the significant disturbance of acid generating rock, the RAO of reducing or eliminating the continued expenditures for water treatment at the Site may be infeasible and may lead to ineffective and misguided interim remedial actions that are intended to reduce or eliminate water treatment costs. Also, these interim remedial actions may exacerbate site problems, and, thus, be contradictory to the NCP.

Response:
EPA must evaluate alternatives that are protective of human health and the environment, attain ARARs (or a waiver from ARARs), and are cost effective (see 40 CFR 300.430(f)). The protectiveness and ARARs criteria are considered thresholds that must be met in order to consider an alternative. The selection process is further defined using the five balancing criteria and two modifying criteria. Cost effectiveness is one of the five balancing criteria in the selection process. This factor follows in importance after the protectiveness and the ARARs criteria. Because EPA has identified the IALs as the water quality standards which must be met during this interim action period, it was determined that the RAO "to reduce or eliminate the need for continued water treatment at the Site' is an appropriate objective within the CERCLA process. Additionally, EPA directs the commenters to page 32 of the Water Treatment FFS where the full list of RAOs is presented. Specifically, the Water Treatment FFS identifies the following objectives prior to the reduction of expenditures:

- to reduce or eliminate detrimental quality water flow into the Wightman Fork;
- to reduce or eliminate acid mine/rock drainage from man-made sources on the Site;
- to reduce or eliminate any human health or adverse environmental effects from mining operations at the Site, to include the Alamosa River.

The EPA feels that these objectives are quite clear and in compliance with CERCLA mandates.

Additionally, one commenter noted that current actions at the Site undertaken by EPA may exacerbate problems and, thus, be contrary to the NCP. EPA believes that each alternative was adequately evaluated for both short and long-term effectiveness and permanence and reduction of toxicity, mobility, or volume. Therefore, by implementing the remedy as planned, EPA can be reasonably sure that problems will not be exacerbated. However, if unforeseen events take place, EPA will take the appropriate measures to ensure that the long-term effectiveness and permanence criteria and the reduction of toxicity, mobility, or volume criteria are met.

The Water Treatment FFS discusses short-term effectiveness in Section 5. Specifically, in the preferred alternative evaluation, Alternative #5 (IROD Alt. #4), states on page 75 under Section 5.6.5 Short- Term Effectiveness:

> "There is an immediate benefit to containment and treatment of all point sources of AMD. Metals removed would not degrade waters downstream waters from the Site.
>
> "Because of the remote location of the Site and existing access restriction, no substantial risks to local communities or population is anticipated by implementation of this alternative.

"Primary risks to personnel working at the Site would be the same as those that currently exist. Measures implemented to minimize these risks are contained in the Site Health and Safety Plan.

"Environmental impacts caused by construction of a solution collection and routing system are considered minimal. Effects from construction of a containment feature would not be significant.

"This alternative provides greater short-term effectiveness than any other alternative, but approximately the same amount as Alternative #6."

EPA believes that the long term effectiveness and permanence and reduction of toxicity, mobility or volume of the preferred alternative is similar to Alterative #6 and greater than Alternatives #1, #3, and #4. Further analysis within the Water Treatment FFS provides the cost-effectiveness element, pp. 75-76, indicating that the cost of Alternative #5 is preferable to Alternative #4. EPA has fulfilled the Selection of Remedy criteria in the NCP within the Water Treatment FFS and does not find the preferred alternative to be contradictory to the NCP.

Comment 64:
The reduction of toxicity, mobility, and volume through treatment criteria discussed for Alternatives 3, 4, 5, and 6, (IROD Alts. 2,3,4 and 5) indicates that effluent WAD cyanide and copper concentrations as low as 0.20 mg/l and 0.05 mg/l, respectively, can be achieved. This information is difficult to assess, particularly since applicable cleanup standards have not been provided. For example, this cyanide concentration would exceed the Final Numeric Criteria Level for cyanide (0.05 mg/l) listed on page 22, while meeting some of the Potential Interim Action Levels listed on page 23.

Response:
One commenter was concerned that the treatment systems identified in Alternatives #3, #4, #5 and #6 (IROD Alts. #2, #3, #4, and #5) will not be able to reduce toxicity, mobility, or volume to ARARs levels. EPA believes that by meeting the IALs the Site will be able to comply with the Segments 3b standards which are ARARs for the Site. The treatment technologies in the Water Treatment FFS alternatives identified by the commenter will be utilized to treat the AMD and cyanide so that the Site discharges meet the IALs at WF-5.5.

Comment 65:
The Water Treatment FFS states that the effects of interim remedial measures are unknown. However, Section 3.8 states that alternatives developed as the interim remedial action (i.e. relocation of materials in CWP, BMD and CC, and plugging of the adits) are significant methods to reduce contaminated water volumes. These statements are inconsistent.

Response:
One commenter found the Water Treatment FFS inconsistent because it states that the effects of the remedy are unknown yet continues to assert that the actions taken at the CWP, BMD/SDI and underground workings are significant methods to reduce contaminated water flows. The Water Treatment FFS evaluated the effects of different water treatment options on Site conditions. The impacts associated with the CWP, BMD/SDI and adit actions are evaluated in separate reports. EPA believes that the long-term effects of water treatment at the site are unknown. Currently, Morrison Knudsen Engineers and the U.S. Geological Survey are conducting studies to more adequately characterize these long-term impacts. EPA believes that the short-term effects are known (i.e., compliance with IALs) and is confident that the short-term source control affects from interim action water treatment activities will mitigate the impacts of the potential short term poor water quality resulting from other activities at the Site. This includes flushing of dirty rinsate from the CWP and BMD/SDI "footprints" which remain after excavation and removal actions.

Comment 66:
The Water Treatment FFS should be more specific regarding the rationale for replacing alkaline chlorination with hydrogen peroxide oxidation. The relative cost impact of using hydrogen peroxide oxidation in lieu of alkaline chlorination should have been evaluated. In addition, alkaline chlorination may be suitable for in-situ destruction of cyanide in the HLP. Therefore, it should have been considered as an alternative in the screening process.

Response:
The use of alkaline chlorination has significant impact on the use of treated waters in the Heap Leach Pad. This is briefly mentioned in the Water Treatment FFS but more fully addressed in the Heap Leach Pad FFS. The Water Treatment FFS addressed the continuation of CDP only inasmuch as required by the HLP effort identified in the Heap Leach Pad FFS. Costs of the Water Treatment FFS allowed for continuation of the existing processes for two years to assist in this task. Alkaline chlorination was considered for AMD treatment after the two year HLP detox period but was ruled out as a treatment option in the Water Treatment FFS. EPA would like to point out that alkaline chlorination technology was applied by former operators at the Site with

minimal success and numerous problems, particularly with scaling, sludge management and reagent material handling. Substantial data is available in the administrative record for the commenter to review in support of this decision.

Additional comments were received regarding the Water Treatment FFS technology evaluations, particularly the screening of hydrogen peroxide, sulfur dioxide, sodium hydroxide, quick lime, hydrated lime, and sodium carbonate technologies. In general, EPA used several different databases to develop these analyses. Morrison-Knudsen Engineers provided a comprehensive evaluation of waste water technology applications at the Site for the RI/FS-please reference the Task #14 report. Additionally, Weston provided a waste water process evaluation in 1993 (REAC Team, February 1993). Substantial input on available technology development was taken from the responses which were received from the Environmental Chemical RFP in 1993 and 1994. EPA would like to refer these commenters to these Site=specific technology databases for technical review.

Individual comments were received about the desirability of heavy flocculation parameters and specific contaminant treatment processes. EPA did evaluate the effectiveness, implementability and cost of a technology which included material handling considerations. Preference was given to those technologies that had lower overall material handling burdens, specifically, lower mounts of sludge generation and, therefore, lower amounts of treatment residual impacts. EPA is directed to evaluate this parameter in 40 CFR 300.430(e)(9)(D)(5) which identifies the evaluation criteria as:

> "The type and quantity of residuals that will remain following treatment, considering the persistence, toxicity, mobility, and propensity to bioaccumulate of such hazardous substances and their constituents;"

Technologies which resulted in larger amounts of sludge generation (i.e., heavy flocculant loading) were graded less favorably than processes that generate less sludge. This analysis parameter was included in the Focused Water Treatment Remediation goals found on pages 32-33 of the Water Treatment FFS, "Minimization of treatment waste products and waste disposal requirements; and, Realization of practical resource recovery to the degree that lowers overall treatment and Site remediation costs." These analyses for the different technology types listed can be found in Section 3 of the Water Treatment FFS, pages 40-57.

Also, EPA believes that the attainable treatment parameters identified in the preferred alternative for suspended solids, arsenic, ferrous iron, mercury and silver were considered sufficient at the current design level to meet ARARs during the interim remedial action period. EPA prefers to obtain a desired cost estimate within an order of magnitude accuracy, stated as +50% to -30% (see OSWER Directive 9355.3-01, Section 6.2.1, pg.6-4). EPA believes this level is achieved with the preferred alternative and the identified COCs from the commenter.

Comment 67:
The cost estimate for Alternative #6 (IROD Alt. #5) does not include a reduction in flows to be treated as was assumed for Alternative #5 (IROD Alt. #4). Yet, no explanation or justification accompanies this decision. Why not?

Response:
The cost estimate for Alternative #6 (IROD Alt. #5) does consider a reduction in treatment from 1996 through 1999. This reduction in costs is related to a reduced treatment volume. However, it is assumed that as treatment volumes go down, the plant will operate at lower flow rates or, below capacity, for most of the year. When a treatment plant is not operating at capacity, the treatment cost per gallon increases. As a result, there are no further reductions in cost. This is an accepted cost estimating practice in the industry where cost efficiency of a plant is related to the percentage of the plant capacity that is utilized.

Alternative #5 (IROD Alt. #4), however, anticipates that the plant will only operate at maximum capacity and will be shut down during periods of low flow. Therefore, a decrease in the overall, annualized, treatment costs is shown in Table 13.

Comment 68:
Anoxic limestone drains are eliminated since "significant disturbance of Site topography during material relocation and reclamation operations precludes construction". This is one example where a lower cost option for water treatment is not available due to other Site activities and increased costs for water treatment are likely clue to lack of an overall, integrated Site remedy.

Response:
One commenter noted that anoxic limestone drains were eliminated from consideration due to the lack of space resulting from source control actions at the Site. EPA has identified anoxic limestone drains as a "passive pretreatment technology" (Water Treatment FFS, pg.54). As such, this technology would not be effective at the Site as a primary treatment technology even with sufficient space to implement this technology. EPA would

like to note that the use of anoxic limestone drains was eliminated from interim consideration during the five year implementation period for this remedy. This technology is still viable to address the pretreatment water flows into the constructed wetlands for the Final Sitewide remedy. The Water Treatment FFS states this in the same effectiveness analysis, "Anoxic limestone drains are generally used to treat AMD before routing to constructed wetlands". EPA believes that the Water Treatment FFS analyses provides the proper perspective on an overall, integrated Site remedy, that is, development of long-term protective passive measures through the interim source control measures. These interim remedial actions found in the Proposed Plans will be implemented to support the eventual cessation of water treatment expenditures at the Site.

Comment 69:
Current sludge disposal practices should be addressed in the Water Treatment FFS since on-site sludge disposal is currently being practiced. Without such information, more meaningful comments cannot be provided.

Response:
One commenter was concerned over current sludge disposal practices on the Site while noting that EPA included a discussion of sludge disposal impacts within the Water Treatment FFS. EPA has included a supporting document in the Administrative Record which encompasses the Site sludge management plan. This document is available through the EPA Region VIII Superfund Records Center or by contacting Ms. Laura Williams, (303) 293-1531.

2.3 Summary and Response to General Comments

Introduction On August 16, 1994, the United States Environmental Protection Agency, Region VIII (EPA), issued four Focused Feasibility Studies (FFS) relating to proposed remedial action work at the Summitville Mining Site. These four FFSs relate to: (1) Cropsy Waste Pile, Summitville Dam Impoundment, Beaver Mud Dump and Mine Pits; (2) Heap Leach Pad; (3) Water Treatment; and, (4) Site Reclamation. EPA requested public comment on the four FFSs and extended the deadline for comment to October 24, 1994.

Comment 1:
A number of commenters complained that some of the alternatives evaluated by EPA in these FFSs are already being implemented without EPA having followed the remedy selection and public participation procedures of the NCP.

In particular, various commenters objected to the continued placement of the Cropsy Waste Pile into the Mine Pits pursuant to an emergency-like schedule, despite public comment on EPA's previously issued Engineering Evaluation/Cost Analysis (EE/CA). This prior public comment stated such action was inappropriate because EPA did not consider the feasibility of capping the Cropsy Waste Pile in its original location and EPA failed to consider potential short and long term impacts on acid mine drainage. Commenters believe removal of the Cropsy Waste Pile and its placement in the Mine Pits will exacerbate site conditions.

In spite of these public comments, EPA awarded a contract in July 1994 to complete the excavation and relocation of the Cropsy Waste Pile (CWP), Beaver Mud Dump (BMD) and Summitville Dam Impoundment (SDI) into the Mine Pits according to the EE/CA and Action Memorandum. Commenters now object to EPA selecting the placement of the Cropsy Waste Pile, BMD and SDI into the Mine Pits as a remedial action alternative. Commenters have suggested that by selecting the EE/CA response action as the interim remedial action, EPA has "pre-selected" the remedial action for the Cropsy Waste Pile and has circumvented the public participation procedures mandated by the Comprehensive Environmental Response, Compensation and Liability Act of 1980, as amended (CERCLA) and the National Contingency Plan (NCP).

Commenters note that both CERCLA and the NCP establish specific steps and procedures that EPA must follow in selection a remedy for all or a portion of a CERCLA Site. See, generally, 42 U.S.C. 9604, 9621; 40 C.F.R. 300.430 and claim that EPA has not followed the NCP procedures. The commenter states that EPA justifies the implementation of the allegedly "pre-selected" remedy by arguing that the public participation undertaken during the EE/CA process last summer satisfies the public's fight to participate in the remedial selection process for the Target Areas.

Response:
Excavation and consolidation activities associated with Cropsy Waste Pile, Beaver Mud Dump, Summitville Dam Impoundment (formerly called the Cleveland Cliffs Tailings Pond), and Mine Pit were initiated under an EPA non-time critical removal action pursuant to Section 300.415 of the National Contingency Plan. Such removal activities are appropriate when, among other things, "excavation, consolidation, or removal of highly contaminated soils from drainage or other areas... will reduce the spread of, or direct contact with, the contamination." (See Section 300.415(d)(6) of the NCP at 55 Fed Reg. 8843 (March 8, 1990).) Once EPA determines such removal actions are appropriate, response actions shall be in as soon as possible to abate, prevent, minimize, or eliminate the threat posed by the contamination to public health, welfare of the

environment. (See Section 300.415(b)(3) of the NCP at 55 Fed Reg. 8843 (March 8, 1990).)

According to the NCP, if a six-month planning period exists before EPA initiates a removal action, EPA must conduct an Engineering Evaluation/Cost Analysis (EE/CA). This analysis, although not as extensive as a Remedial Investigation/Feasibility Study, identifies the objectives of the removal action and analyzes the various alternatives that may be used to meet these objectives, based on the alternative's cost, implementability and effectiveness. The EE/CA is then released for public comment, according to the public participation procedures established in Section 300.415(m)(4). Finally, after a minimum 30-day public comment period, EPA issues an Action Memorandum which documents EPA's selection of an appropriate non-time critical removal response action. See also, "Guidance on Conducting Non-Time Critical Removal Actions Under CERCLA," EPA/540-R-93-057, Publication 9360.0-32 (August 1993).

EPA meticulously followed the NCP-prescribed procedure in proposing and selecting the EE/CA-based non-time critical removal for the Cropsy Waste Pile, Beaver Mud Dump, Summitville Dam Impoundment (formerly called the Cleveland Cliffs Tailings Pond) and Mine Pit (collectively, the Target Area). EPA published its EE/CA in July of 1993, solicited and accepted public comments on the EE/CA until early September of 1993, responded to those comments in its "Responsiveness Summary to the Engineering Evaluation/Cost Analysis for the Cropsy Waste Pile, Beaver Mud Dump, the Cleveland Cliffs Tailings Pond (now called the Summitville Dam Impoundment), and Mine Pits, Summitville Minesite, Rio Grande County, Colorado," and issued its Action Memorandum on September 24, 1993. EPA let a contract to begin implementation of his part of the EE/CA-based removal action in July 1994.

EPA is not arguing that providing the public the opportunity to comment on the EE/CA is sufficient to substitute for soliciting public comment on the Target Area FFS and Proposed Plan. EPA agrees that the NCP does not allow EPA to satisfy its public participation obligations for a proposed plan by reference to another document. EPA also agrees that the analysis EPA conducts to evaluate removal alternatives differs greatly from the analysis conducted to evaluate remedial alternatives. For non-time critical removals, EPA evaluates the alternatives in terms of effectiveness, implementability and cost alone. The evaluation of remedial alternative is conducted using the nine criteria of Section 300.430 of the NCP. The two sets of evaluation criteria are not synonymous.

EPA, however, did fully comply with the NCP-prescribed procedures for screening, proposing and selecting remedial alternatives for the Target Areas in its Focused Feasibility Study, Proposed Plan and Interim Record of Decision (IROD). The removal alternative previously selected in the Action Memorandum was one of the alternatives evaluated during EPA's remedy selection process. EPA took public comment on the relative merits of all alternatives evaluated in the FFS vis-a-vis the nine NCP criteria and proposed its preferred alternative in a Proposed Plan, issued in accordance with Section 117 of CERCLA. The alternative previously selected in the Action Memorandum, as expanded in the FFS and Proposed Plan, met the threshold remedy selection criteria of the NCP and provided the best balance of the NCP's "balancing" and "modifying" criteria. It was selected as the appropriate remedial action in the Interim ROD for the CWP. In accordance of the remedy selection criteria of Section 300.430(e) and (f) of the NCP.

EPA therefore selected both the EE/CA-based removal action and interim remedial action according to the different, applicable standards and procedures of the NCP. The fact that the two response actions are similar does not make the implementation of the previously selected removal action illegal or invalid. Moreover, with the letting of the July 1994 contract, EPA was merely imitating the implementation of its validly selected removal action. EPA's publication of the Target Areas FFS and Proposed Plan has no bearing on and should not interfere with EPA going forward with this removal action.

Comment 2:
One commenter strongly recommends that EPA delay removal of the Cropsy Waste Pile until all the potential ramifications have been properly evaluated by the public and by competent technical consultants. Such an evaluation should be conducted after EPA's "Use Attainability Study," which will characterize and evaluate downstream effects from the Site, is completed. The commenter believes there is no reason to implement this remedy on an expedited schedule.

Response:
The Use Attainability Study is being completed by the State of Colorado, Division of Minerals and Geology. The findings of this study will be incorporated into EPA's final response action for the Site. In the meantime, EPA believes the environmental benefits that will be gained from the implementation of interim remedial actions at the Site far outweigh the continued releases of mine waste.

Comment 3:
Commenters requested an explanation of EPA's rationale for issuing interim rather than final RODs. These commenters feel EPA has no legal or technical basis for issuing IRODs and that there will be additional costs associated with first implementing an interim remedy prior to making a final remedy selection. They also expressed the belief that some of the interim remedial actions may actually exacerbate site conditions and

contamination or may prove ultimately incompatible with final remedial action(s) for the Site.

Response:
According to EPA guidance, interim remedial actions are appropriate to "take quick action to protect human health and the environment from an imminent threat in the short term, while a final remedial solution is being developed." See, "Guide to Developing Superfund No Action, Interim Action and Contingency Remedy RODs," US EPA, OSWER Publication 9355.3-02FS-3 (April 1991), at p. 5.

Deterioration of site conditions will lead to continued and heightened exposure of sensitive human and ecological populations to heavy metals and chemicals (e.g. cyanide) used by Galactic and others in their mining operations. The IRODs institute temporary measures to stabilize the Site and prevent further migration of contaminants of concern from the Site into surrounding soil, air and water media. Further, the types of interim actions selected in the IRODs, such as the relocation of contamination from one portion of the Site (CWP) to another (Mine Pits) and the installation of caps to prevent further migration of contaminants are exactly the types of response EPA guidance states are appropriate to implement as interim remedial actions. See, "Interim Final Guidance on Preparing Superfund Decision Documents," OSWER Directive 9355.3-02 (June 1989), at Chapter 9.

Given the existing Site conditions, EPA is certain that filling the Mine Pits will significantly reduce the flow into the Pits and prevent discharges of acid from the Mine Pits into underground workings and ground water. Relocating other mine waste features such as the Cropsy Waste Pile, Beaver Mud Dump and Summitville Dam Impoundment to the Mine Pit will also mitigate these are as sources of acid mine drainage. Capping the Mine Pits will serve to eliminate or significantly reduce the movement of contaminants of concern through water and air pathways. Treatment of surface water and detoxifying the Heap Leach Pad will eliminate releases of metals and cyanide. Overall, the implementation of interim response actions will quickly reduce the imminent threats to human and environment receptors at and around the Summitville Minesite. EPA will also continue to monitor the progress of these remedies in eliminating or reducing the release of hazardous substances from the Site and will determine what, if any, final remedial actions are necessary to address the remaining risks at the Site.

Comment 4:
Many commenters sought clarification which applicable or relevant and appropriate requirements (ARARs) of federal and state statutes and regulations must be complied with for remedial actions at the Site. Commenters wanted an identification of which ARARs will be met with by the interim actions and which ARARs will be waived. One commenter cautions against the use of "Technical Practicability Waivers" as shortcuts in the remediation.

Response:
The ARARs clarification is provided in the specific Responsiveness Summary on ARARs. Each IROD also identifies the relevant portions of federal and state requirements are being complied with or waived in the implementation of the interim remedial actions. Commenter should be assured that all ARARs waived with the selection of interim remedial action will be re-evaluated for the final remedial action(s) for the Site.

Comment 5:
One commenter noted that each of the FFSs states an "observational site approach" will be taken as part of EPA's interim remedial actions. This commenter believes that an observational approach may be an effective approach to site remediation, provided that all the possible outcomes of the proposed action are identified, evaluated and monitored. The commenter suggested that for potential outcomes that may have adverse consequences, the impacts associated with those outcomes and the probability of their occurrence must be qualitatively defined. If adverse consequences are likely, or that site conditions could be make more complicated and problematic, then implementation of the proposed remedy must be reconsidered. Finally, the commenter declared implementation of a remedial action without an overall plan for each dealing with range of the potential outcomes is inconsistent with a responsible observational approach at a complex site like the Summitville Mine Site.

Response:
As discussed in the "Analysis of Alternatives" section in each of the IRODs, EPA has considered all the relative merits and detriments of the potential remedial actions evaluated. "Potential adverse consequences" of implementing the alternatives was evaluated, as was EPA's ability to deal with these potential adverse impacts when EPA reviewed the overall protection to human health and the environment, long-term effectiveness and permanence, short-term effectiveness, implementability criteria of the NCP. The interim response actions selected in the IRODs represent the alternatives that provide the best balance of meeting these criteria. EPA will employ the "observational approach" to continue to evaluate these interim remedial actions' effectiveness in meeting these NCP criteria, EPA's remedial action objectives and performance standards and to determine what, if any, additional final remedial actions are necessary to ensure that human health and the environment are protected against all acceptable risks posed by hazardous substances remaining at the Site.

Comment 6:
A number of commenters are concerned about EPA's estimate of costs to be expended at the Summitville Site are too low. Commenters have calculated those costs (both removal and remedial) as exceeding EPA's $120 million estimate. They are concerned that the staggering amounts for interim response do not include the cost of the final remedy or remedial investigation/feasibility studies presently being conducted at the Site.

Response:
The commenters are correct in their observation that EPA's initial cost estimate has been exceeded with the collective costs of the interim remedial actions selected in the IRODs. The alternatives selected in the IRODs were screened for cost, and EPA believes that they are cost-effective. As studies at the Site provide additional information and as remedial actions are implemented, costs for remediation of the Site will continue to be reassessed.

Comment 7:
Commenters object to the backfilling of the Mine Pits and the plugging of the Reynolds Adit, since in their view, these actions preclude a future beneficial use, that of re-mining. The commenters believe that EPA's remediation activities should be immediately terminated or suspended until the impact to future mining uses can be thoroughly evaluated.

Response:
None of the proposed or completed EPA activities preclude further mining activities at the Site. However, any future mining activities must be consistent with and not interfere with the response actions EPA has implemented at the Site. EPA's remedial actions are intended to prevent the exposure of humans and ecological populations to hazardous substances. Any future mining activities that do not exposure these populations to hazardous substances may be acceptable to EPA. It is anticipated, however, that EPA will have to review any future mining plans to ensure the protection of human health and the environment.

Comment 8:
Commenters object to EPA's lack of a comprehensive Record of Decision for the Site and the implementation of parallel or isolated and disjointed actions at the Site without any overall plan or remedial strategy for the Site. To remedy this lack of coordination, the commenters suggest that an independent board of technical experts review and select Site response actions.

Response:
EPA believes that the interim remedial actions selected in the IRODS provide a comprehensive, coordinated approach to addressing the risks at the Site. Specifically, EPA believes that all the remedial measures to be implemented according to the IRODs will go a long way in improving sitewide water quality by controlling surface run-on and run-off, erosion, leaching and metals and other contaminant loadings to the Alamosa River.

Empowering an independent board of technical experts to review and select remedial actions at the Site is improper under the Sup~d law. Congress explicitly charged EPA with the authority to select response actions to cleanup releases of hazardous substances under the CERCLA Section 121 of CERCLA. In fact, this section of CERCLA unequivocally states that "the President shall select appropriate remedial actions determined to be necessary to be carried out under section 104 or secured under section 106 which are in accordance with this section, and to the extent practicable, the national contingency plan..." [emphasis added]. The President has delegated that authority to select response actions at Superfund sites to the Administrator of EPA. The procedures the Administrator must follow in selecting these cleanup actions are contained the National Contingency Plan.[1] The NCP provides that affected and interested parties, such as States, PRP and citizens are given the opportunity to participate in the selection process, but it is clear that the Administrator retains the responsibility to select the appropriate remedy.

Thus, while EPA welcomes input from the community and neutral third parties concerning the actual health risks from lead-contaminated mining wastes, EPA cannot abrogate statutory responsibility to be the decision maker in selecting remedial actions for Superfund sites. EPA can also not allow a third party to determine the appropriate scope of EPA's remediation plan, since it is our experience in identifying health and environmental risks and designing the remedies to address them that Congress relied upon when it empowered us with the authority to select and implement remedial actions under Superfund.

---

[1] See. e.g. Section 120(e)(4) of CERCLA (where if the head of the relevant federal agency and the Administrator of EPA cannot reach an agreement of the remedial action to be selected, the Administrator selects the remedy).

Comment 9:
One commenter noted that downstream impacts are currently being ignored and avoided despite the above stated Remedial Action Objectives. Avoidance of downstream impacts adversely affects Terrace Reservoir, household and municipal wells and allows agricultural land to further degrade.

Response:
Due to the Chandler Adit drainage, all downstream targets are being addressed as quickly as possible. All three areas mentioned above are part of major research efforts included in the justification of remedial actions at the Site. Terrace Reservoir is currently undergoing a study conducted by the U.S. Geological Survey. Agricultural lands have undergone several studies, including those conducted by Colorado State University. With regard to household water use, local water supplies have been sampled twice and are undergoing long-term water sampling.

Comment 10:
The same commenter stated a site drainage plan, which provides control for surface/subsurface drainage, storm water and sedimentation management and non-point source collection/treatment, is needed.

Response:
A site drainage plan has been implemented. A copy of the plan is available in the Administrative Record.

Comment 11:
One commenter identified a need for a waste management plan.

Response:
A number of the IRODs have elements is designed to meet waste management ARARs. The Sampling and Analysis Plans describe how investigative derived wastes are managed. Also, used oil is being recycled and, as stated in the Focused Feasibility Study, sludge produced on-site is being recycled for metals recovery.

Comment 12:
One commenter is concerned that EPA does not have sufficient date to establish the Summitville Dam Impoundment (SDI) as a source of sulfide-rich tailings and metals-laden acidic water discharged to Wightman Fork. The lack of this data calls into question the need to remediate the SDI at all, or at least the nature and extent of such remediation. The commenter suggests EPA collect additional data regarding the nature and extent of contamination at the Beaver Mud Dump (BMD) and SDI before proceeding with remediation of these areas.

Response:
Historically, the Summitville Dam Impoundment and the Beaver Mud Dump area have been of significant concern to regulators from the State. Water discharges emanating from these materials has been recorded as being of poor quality. Based on existing data, historical precedent, and current sampling and analysis information, EPA determined that the SDI and BMD are significant contributors of man-made AMD at the Site. Data collected by Anaconda prior to SCMCI operations states that the mill tailings disposed of in this area are strong AMD generators. Movement of these sources and the Cropsy Waste Pile to the Mine Pits allows capping of four AMD sources in one action.

Comment 13:
One commenter argues that the FFSs and Proposed Plans fails to comply with the NCP because: (1) these documents evaluate the "No Action" alternative for the Site as a whole, rather than by the subject matter of each interim remedial action, (2) they fail to consider naturally-occurring background concentrations of metals and acids in EPA's analysis of alternatives, and (3) compliance with ARARs and/or ARAR waivers have not been identified with any amount of specificity.

Response:
Alternative No. 1 for each of the Focused Feasibility Studies is a No-Action Alternative related to that particular portion or media of the Site.

Naturally-occurring background levels of metals and acids were taken into account when evaluating ARARs for the interim remedial actions. For example, EPA determined it was appropriate to waive the Segment 3b stream classification as an applicable requirement that must be met by the IRODs because of the historic contributions of metals and acids from naturally-occurring sources. EPA will determine if this ARAR should be waived in any final ROD(s) for the Site when additional background and load reduction information is collected.

Comment 14:
Cleveland-Cliffs Iron Co. and Union Pacific Resources Company Submitted information regarding their (or their predecessor-in-interest's) operations at the Site, their analysis of the current state of CERCLA case law related to liability and legal arguments evaluating their liability at the Site. These commenters also

requested that EPA refer to the area adjacent to the Beaver Mud Dump, which EPA has referred to as the Cleveland-Cliffs Tailings Pond, as the Summitville Dam Impoundment or some similar appellation.

Response;
While EPA appreciates information regarding parties' prior activities at the Site, particularly if this information supplements EPA's CERCLA 104(e) information requests or helps EPA to characterize the wastes at the Site, EPA believes a submission that purports to provide comments on an FFS and Proposed Plan is an inappropriate forum to state one's view of its liability at the Site. Such comments are more appropriately submitted as part of a party's response to EPA's CERCLA Section 104(e) request, EPA's Notice Letter or in confidential settlement correspondence between EPA and the submitting party. A specific response to Cleveland-Cliff/UPRC's legal arguments will be forwarded under separate cover.

Without any qualitative judgment on the merits of Cleveland-Cliff/UPRC's legal arguments, EPA nonetheless agrees to hereafter refer to the area below the Beaver Mud Dump as the Summitville Dam Impoundment. Corresponding changes to this nomenclature will be made in all future EPA documents.

RESPONSIVENESS SUMMARY: GENERAL WRITTEN COMMENTS RECEIVED FROM CITIZENS AT LARGE OF THE SAN LUIS VALLEY

These written comments represent the universe of comments received through the end of the public comment period.

Comment 15:
To whom it may concern: My name is Roger Gallegos I have lived in the San Luis Valley just about all my life. Before the Summitville Mine came to exist, life was good. After they exploited the government and us, life became much more difficult. Take for instance, when we would water our fields, we could catch fish in our ditches. Another thing I have noticed is the crop yield. Before the mine came in my meadow would yield 3000 to 3200 bales of hay. When the mine had there spills I yielded 1642 bales. My best year while the water quality improved was about 2853 bales. Now this may not sound important, but it is. I used to sell hay for a living, and now I feed it to my cows. The mine has hurt my family in the pocketbook. We have all been hurt by the mine in this community. The government should never have let them start to begin with. Galactic Mining should be made responsible for the clean up. then the Government for allowing them to do this. Since the mining company has gotten away with this, we should not be made to suffer for other peoples mistakes. I say Summitville should be cleaned up and restored, and our water be put back to normal. My Great Grandfather made a living with my ranch, as did my Grandfather and Dad. I want my kids and their kids to continue making a living on what is theirs. They have that right, and not be forced to suffer for what someone else was allowed to do. I myself believe the plan to filter the water down below where the creeks meet, is the best idea. That system for 8 million, could save money and work. Thank you for listening. The Gallegos Family. [Letter; undated; no other data given]

Comment 16:
Dear Ms. Williams: As a farmland owner with land irrigated from the Alamosa River I am deeply concerned and worried what the continued use of the contaminated water will eventually do, not only to the land, drinking water from the wells, but also to the livestock and products which are ultimately consumed by the general public. There are those who say it has no ill effects on crops or livestock - but for how long. I do know it has played havoc with the steel structures in the irrigation system. I'm under the Capulin Ditch and we have had to spend over $40,000.00 replacing all steel structures. I may say that I was Water Commissioner for this district and know the Alamosa River quite well. In this time I never saw when so many irrigation structures all deteriorated in such short time. As for those who say there never were any fish in the Alamosa River - it is not true. Why else would the Game and Fish Department consider it a fishing stream. People would ice fish all winter in the Terrace Reservoir up to the time the mine started to dump the mess into the stream. I have lived here all my life and can remember when we were little Dad would take us fishing there. As for the different options to solve the problem it seems to me one that would treat all the water before it got into the Alamosa River would be the one - probably in just one pond. Thank you Sincerely, Leo B. Gonzales [Letter; dated Oct. 19, 1994; address and phone number given]

Comment 17:
Dear Ms. Williams & EPA Summitville Team: Although I may be writing too late for the case record, perhaps your comment period's been extended; in any case, the information leading me to voice my concerns reached me after the original deadline. Your recommended plans generally seem to stress reliance on systems that won't need too much up-keep once set in place. The biotreatment aspect sounds favorable. However, it has come to my attention that "caps" or "plugs" contributed to poorer water quality late in this year's irrigation season, since the caps rechanneled contaminated-water-into other-drainage-channels that weren't serviced by your water treatment facilities. This indicates two planning factors to me: 1. you'll want to assess where water will eventually seep out before you start filling the mine pits with waste materials that are likely to displace ground water, and 2. it would make most sense to locate your water treatment unit(s) as far downgradient as possible, even if this entails relocation of the existing facilities. I was also surprised

that the reclamation plan *mentions no reseeding or tree transplanting details. Although it may or may not mean anything scientifically, I notice that the Alamosa creekbed's rocks have a much less "rusty" surface coloration near my house than they ever did during SMC's last four years. Thanks for your efforts.
Sincerely, Paul Sinder [Letter, dated 9/27/94; address given]

Comment 18:
To Laura Williams: I am writing to voice my concern on the clean-up efforts being taken at the Summitville mine site. Mainly, I would like to state that I fully support the alternatives researched and proposed to you by the T.A.G. committee. I hope the E.P.A. system is flexible and the T.A.G. proposals not only be reviewed, but also implemented. I thought the public meeting on October 12th, was very informative and positive. It led me to believe that, although you have plans made and on paper, you are open to suggestions, criticism and change. The T.A.G. proposal on water treatment is to my opinion a priority. It will make an immediate difference in the water quality coming downstream and into our valley. I do hope this will be realized as soon as possible, it seems common sense. Looking at the T.A.G. proposals, I think they have found several solutions which promise more interesting and better results (and in some cases a smaller price tag). A question I have too, is whether the E.C.C has the experience to tackle the job up there. How many other experts and companies have been approached for their expertise and advice? I am optimistic that you will find a way of working together with the T.A.G. team in finding the right solutions. I appreciate the work you are doing and am keeping my fingers crossed that all goes well. I realize it's a tough and very complicated job.
Sincerely Lisa ter Kuile A rural resident surrounded by Terrace irrigated land [Letter; undated; no other data given]

Comment 19:
Dear Ms. Williams: We want to support the recommendations made by the TAG for the Summitville Mine Site. We are concerned here in Conejos County about water quality and the long term effects of the Summitville Mine Site. We want the agricultural community in our county to remain stable so our role as County Commissioners must look toward the future and address the long term consequences connected with this site. Please take the TAG recommendations seriously, the quality of our land and water will determine the future of our community.
Sincerely, Le Roy Velazquez, Chairman Conejos County Commissioners [Letter;, dated October 18, 1994; typed on Conejos County Government letterhead]

Comment 20:
Dear Ms. Williams: We, as Board of-Directors of-the Valle-del Sol Community Center in Capulin, are extremely concerned about the Summitville Mine Site and its continuation clean-up efforts. We are very interested in the quality of our water for our homes as well as for our farms. We support the enclosure made by the Technical Assistance Grant Committee. We have showed our interest by making our community center available for meetings so that the community will continue to be informed and to participate in the process. If there is anything else we can be doing, please let us know. We are fully aware that the results of the Summitville Mine Site on the quality of our water will determine our livelihood in Caputin.
Sincerely, Valle del Sol Community Center Board of Directors. [Letter; dated October 18, 1994; five signatures, spelling approximate: Rev. Randy Brennig, Dehna Ramirez, James A. Quintana, Cindy Medina, Julia Gomez-Nuanes; typed on Valle del Sol Community Center letterhead]

Comment 21:
Dear Ms. Williams, After reading the TAG newsletter and listening to Maya ter Kuile, I have some misgivings about the E.P.A. plans for Summitville. The TAG suggestions surely seem much more reasonable and straight forward than the EPA's approach. Their cost effectiveness seems much more desirable also. As a new resident to the area I urge you to look again at what has occurred to the Alamosa River; consider all of us who drink and irrigate in this area and rethink your approach to what you (i.e. EPA) are doing at Summitville.
Thank you [Letter, dated 21 Oct 94; unreadable signature; address given]

Comment 22:
Dear Ms. Williams, I am writing you to voice my support for the Technical Assistance Grant Committee's response to the EPA's action plan for clean-up of the Summitville Mine Site. I encourage your department to work with the TAG Committee for a thorough clean-up operation with SLV citizen input. Thank you for your consideration -
Sincerely, Susan Sawyer [Letter; undated; address given]

Comment 23:
Dear Ms. Laura Williams, I am writing concerning the Summitville mine clean-up. I attended and appreciated the meeting on Oct. 12, where the EPA presented their progress and future for clean-up, and the TAG presented their answer and their suggestions on how to improve the current trend. I have heard and read both sides of the issue. I, as do the residents of this community, appreciate the work and the concern that the EPA has shown to clean up this mess. Receiving Superfund status at such a fast rate was excellent. We are really grateful to the organization. My concern, as most of the community's, is the form in which the clean-up is being performed. Some things were done in obvious haste due to the situation and the consequences are now

being observed i.e.: the Reynolds adit plug and the Chandler adit leak. The best thing to do, I believe, is to sit back and really assess the situation before any more mistakes are made. The TAG has gone up there, researched the situation, consulted with experts and presented a different point of view. I listened to both sides (EPA versus TAG) and came to the conclusion that the TAG had much better and faster results than the current method. I was much more comfortable with the research done by the TAG group, seeing that it was done more in depth and with well experienced experts. The cost, being of great concern to many, would also be less if you reviewed the TAG group's point of view. There are many that say that this river has always been polluted. Most of these people do not reside close to this river or even in the vicinity. Many live in other counties. I, as many other people in this community did, fished, not only in this river but also on Terrace Reservoir, not too long ago (1984-85). This river has not always been polluted. Maybe it's had it's ups and downs, but it has never been dead. Not only do fish not exist any more but algae can't even grow any longer. I am stating this because I have heard of people wanting the EPA to pull out, saying that this river has always been polluted. These people do not know the facts and magnitude of the damage that can occur and won't see into the future at what will happen to this valley if nothing is done. I really hope that you really take careful consideration on all our letters, and take the TAG group's suggestions seriously and implement their ideas. Thank you for your time and hope you will have another update meeting soon. Sincerely, Nitschka ter Kulle and Steven Miller Home and Land Owners, 1/4 mile from Alamosa River. [Letter; dated Oct 20, 1994; other data not given]

Comment 24:
Dear Ms. Williams: I have reviewed the TAG committee's recent newsletter and have discussed the feasibility studies that were done and submitted to the E.P.A. with a TAG committee member. I would like to comment. First, I would like to tell you that our farm has been in our family for five generations. It is irrigated with water from the Alamosa river which flows through our farm. My husband and I worked for over forty years to purchase various parcels of land to make up what is now the present 435 acres. It would be a severe financial loss to my family and to the other farm families here to be forced to abandon our farms should the water quality of the Alamosa become incompatible with safe crop and livestock production. I feel the TAG committee has done an excellent job in their feasibility study and in the suggestions they have made. I urge the E.P.A. to consider water treatment to become a top priority and to take the TAG committee's suggestion to build a water treatment plant at the bottom of the mine site, rather than to continue with the current treatment plan, which is not only more costly, but would delay the treatment of the water in time to prevent damage to thousands of acres of farmland. Sincerely yours, Leola T. Miller [Letter; dated October 20, 1994; address given]

EPA RESPONSE TO WRITTEN COMMENTS RECEIVED FROM CITIZENS AT LARGE OF THE SAN LUIS VALLEY

EPA will address citizen written comments in one response. All but one of the citizen comments expressed direct concern with water quality issues as related to water quality conditions in the Alamosa River resulting from mining activities at the Summitville Mine. Many citizen comments received expressed support for the TAG committees recommendations, particularly regarding the location of the existing on-site Water Treatment Plant and associated costs.

EPA appreciates the fact that citizens have taken the time to attend the public meetings and review the proposed plans and recommendations. EPA feels that citizen input is a component of the decision making process and the concerns raised regarding water quality are valid and deserve consideration. EPA further recognizes the time and effort expended by the TAG to evaluate the proposed plans and develop constructive recommendations. As with citizen involvement, EPA realizes that impartial technical assistance provides value in the decision making process.

EPA is also cognizant of water quality issues which are central to human health, agricultural impacts, and activities related to fishing, recreational or otherwise. EPA agrees with citizen concerns especially as they relate to water quality.

It is the intent of EPA to integrate recommendations made by the TAG into the final consideration of alternatives. These may be especially pertinent to specific elements of the Site Reclamation options. In a letter from the Forest Supervisor of the San Juan/Rio Grande National Forest dated October 17, 1994, the Forest Service expressed agreement-in-principle with the preferred alternative #4 for site reclamation, stating that "it certainly seems to be the most reasonable and cost effective in terms of restoring the area to a productive capacity".

The letter also stipulates that, pursuant to the current Master MOU (Memorandum of Understanding) between EPA and the USDA Forest Service, the Forest Service agreed to "provide expertise related to natural resource management and protection...". In response to the proposed plan for site reclamation, the Forest Service has offered expertise, "particularly in the area of soil/surface reclamation," based upon its "considerable experience in conducting high elevation reclamation." EPA feels that recommendations made by the Forest Service are valuable and will be carefully considered in final selection of specific elements of the reclamation plan, particularly those relevant to revegetation.

Regarding the alternatives for water treatment, EPA recognizes TAG concerns in discriminating between Alternative 5 and Alternative 6 and TAG suggested modifications to Alternative 6. EPA further recognizes similarities between the two alternatives. EPA acknowledges TAG efforts in acquiring cost estimates from potential vendors. Relevant to costs for constructing a new water treatment facility, EPA is cognizant of potential difficulties associated with acquiring broad-based cost estimates from potential vendors who may or may not be as familiar with site-specific conditions. Site specific conditions can dramatically affect proposed costs regardless of the experience and intentions of potential constructors. However, EPA will take TAG recommendations under advisement and continue to seek comment from TAG members.

2.4 Summary and Response to ARARs Comments

Comment 1:
Commenters noted that Section 3.2 of the Water Treatment FFS - Applicable or Relevant and Appropriate Requirements - states that the NCP allows waiver of Applicable or Relevant and Appropriate Requirements (ARARs) for interim remedial measures that do not exacerbate site problems and do not interfere with the final remedy. The WTFFS implies in Section 5.0 - Detained Analysis of Alternatives - that interim remedial measures that do not fully meet interim water quality numerical standards may be acceptable provided the waiver provision is applied. The waiver provision or its use in this instance is not adequately addressed relative to its potential impact on the selection of a preferred alternative and the final remedy.

Response:
EPA agrees that the inclusion of the waiver discussion in the WTFFS is confusing. Accordingly, EPA has made it clear in Section 1.5.3.1 of the Water Treatment IROD that the cumulative effect of the interim remedial actions should allow EPA to attain surface water quality ARARs. No surface water quality ARARs are being waived in these IRODs.

Another commenter questioned the elimination of biomass and ultrafiltration alternatives from further elevation in the WTFFS and IROD. The commenter argued that these alternatives should not be eliminated from consideration became, without establishing ARARs, EPA cannot be certain that "further contaminant removal may not be warranted." Similarly, electroplating is eliminated for detailed alternative analysis since the "currently used technology does not produce a concentrated liquid waste stream." The commenter argues that the WTFFS should, have considered the possibility of modifying current treatment processes so there would be a concentrated waste stream acceptable for electroplating and metals recovery.

Response:
EPA established the sitewide ARARs that must be met in the ARARs Addendum to the HLP FFS. EPA incorporated these ARARs by reference to the WTFFS as well. While EPA agrees that this approach may have confused the commenters on the federal and state law requirements and regulations (or portions thereof) that were applicable or relevant and appropriate to the various IRODs, each IROD now contains a separate and complete discussion of the ARARs that must be met by the interim remedial action selected.

Since the sitewide ARARs had already been identified in the "ARARs Addendum to the HLP Focused Feasibility Study Report", this further refinement of ARARs as they relate to each of the IRODs represents only a minor change to each FFS and Proposed Plan. Consistent with its "Interim Final Guidance on Preparing Superfund Decision Documents", OSWER Directive 9355.3-02 (June 1989), EPA has determined that this minor change will have little or no impact on the overall scope, performance, or cost of each alternative as originally presented in each FFS or Proposed Plan.

The commenter should also note that EPA may eliminate interim alternatives on the basis of cost if other interim action alternatives are effective and satisfy the interim objectives and goals. EPA eliminated the biomass, ultrafiltration, and electroplating alternatives on the basis that the cost were grossly excessive when compared to their overall effectiveness. See 40 C.F.R.s 430(e)(7)(iii) and "Guidance on Feasibility Studies Under CERCLA," EPA 540/G-85/003 (June 1985).

Comment 3:
A number of commenters noted that the ground water ARARs are also poorly defined, causing EPA difficulty in determining whether groundwater ARARs can be met by EPA remedial activities. These commenters challenged EPA's adoption of surface water quality standards for ground water resources, citing a lack of data. Commenters noted the fact that surface water consists of snow melt and storm water runoff, plus baseflow contributions from ground water sources. The commenter argued the Site has historically exhibited high total dissolved solids (TDS) in the ground water and that EPA has not adequately characterized other background water quality conditions. Water quality data from surface water sources typically shows less TDS than from ground water tributary sources. The commenter believes EPA has failed to account for this data in selecting ground water quality standards.

Response:
EPA has determined that the classification system prescribed by the Colorado Ground Water Standards is applicable or relevant and appropriate to assignment of standards to groundwater at Superfund sites within Colorado. Since the Colorado Water Quality Commission has yet to classify the Sitewide groundwater, numeric ground water for COPC standards are not currently applicable or relevant and appropriate to ground water quality at the Site. The interim ground water narrative standard adopted by the Colorado Water Quality Control Commission on July 29, 1994, however, is applicable to the Site. This standard, which became effective on August 30, 1994, requires that the ambient water quality as of January 31, 1994, continues to be met. This ARAR will be met by compliance with EPA's interim action levels and with all surface water quality ARARs, as discussed in each of the IRODs.

EPA, like the commenter, moreover, recognizes the hydrological interconnection between the surface and ground water flows at the Site, particularly during baseflow periods. EPA expects, therefore, that once the CWQC completes its use attainability study and classifies Site ground water, this classification will be applicable to the Site. This ARAR will be attained by the final remedial action(s) for the Site.

Comment 4:
Commenters question EPA's use of the most stringent stream classification - that of Segment 3b of the Alamosa River - as the controlling surface water and ground water quality ARAR. They state EPA has adequately explained why it has selected this stream classification as the "controlling" standard. Further, commenters argue that the numeric criteria based on the most stringent stream classification does not account for the lower classifications of other stream segments or for high background levels of copper, zinc and other hazardous substances in the Wightman Fork and Alamosa River which are the result of naturally occurring oxidation and transport processes acting upon highly mineralized, unmined and unprocessed rock in the area. EPA, they opine, cannot remediate water quality below naturally-occurring background levels. Lastly, commenters argue that the State erred in designating Segment 3b of the Alamosa River as Class 1 Cold Water Aquatic Life, and that this standard can never be attained because of background levels of metals. They suggest that EPA waive this flawed classification based on the technical impracticability of achieving these water quality standards and the State's failure to consistently apply them, as evidenced by the creation of NCLs in the permit and 1991 Settlement Agreement.

Response:
First, the Commenters should understand that despite a Class 2 designation in Terrace Reservoir (Segment 8), Segment 8 carries hardness-based TVS as the ambient standards. Because the hardness in the Alamosa River decreases with increasing distance from the water treatment plant at the Summitville Site, the ambient water quality standards in Terrace Reservoir (Class 2) are more stringent than those assigned to Segment 3b (Class 1).

The commenters should also note that the CWQCC originally proposed to upgrade Terrace Reservoir to Cold Water Aquatic Life Class 1 but declined because of limited data. In fact, review of Exhibit 12 to November 1, 1993 hearing held by the CWQCC in Alamosa, reveals the intention to collect needed data and review suitability for upgrade to a Class 1 designation. As stated in the HLPFFS, at this time EPA believes that employing the Segment 3b standards will contribute to attaining Class 1 uses in Terrace Reservoir and should contribute to attaining the existing, more stringent, hardness-based TVS assigned to Terrace Reservoir.

As the commenter is aware, the re-evaluation of water quality standards in Colorado streams, rivers and reservoirs is an ongoing process controlled by the Colorado Water Quality Control Commission (CWQCC). In its discussion, EPA specifically recommended the inconsistencies and concluded that the Colorado Water Quality Standards (CWQs) for Segment 3b of the Alamosa River, as the applicable ARARs, will serve as the numeric interim remedial action goals for the Site.

At this time EPA does not have a basis for usurping the CWQCC authority to determine appropriate classification and water quality standards for the Alamosa River and its tributaries. As additional data is gathered and the effects of the interim actions are quantified, it is within the CWQCC's authority to address all of the issues identified in these comments. Until that time, EPA will use the existing standards as numerical goals for the remediation.

In the HLPFFS, EPA made its intention to attain surface and ground water quality ARARs at Segment 3b of the Alamosa River clear. The attainment of the ARAR for Segment 3b will be monitored using a "bubble" approach at the downgradient boundary of the Site, monitoring point 5.5 in the Wightman Fork (WF 5.5). In this way, no single interim remedial action alone is expected to bear the burden of ARARs attainment.

Where the action-specific ARARs associated with interim remedial actions at the Summitville Site require identification of an ambient-water-quality-based-end point (i.e. NPDES point source permitting), the applicable CWQSs for Segment 3b are established using a model to back calculate compliance at WF 5.5. This modeling resulted in EPA's establishment of interim action levels (IAL).

As noted in the HLPFFS, given the active interchange typical of alluvial ground water and surface water in high mountain valleys, EPA has determined that attaining compliance with surface water quality ARARs and the ground water interim narrative standard will protect both surface and ground waters. This interchange will only compel ground water cleanup to the extent required, in combination with other actions, to attain at the point of compliance (WF 5.5) and thereby meet the standards established for Segment 3b.

The commenter should also be aware that the background concentrations of metals and acids have been considered. At the triennial review of the Rio Grande Basin the Colorado Water Quality Control Commission (CWQCC) did recognize that background metals concentrations in Segment 3a can be attributed to natural acid mine drainage from Iron, Alum and Bitter Creeks. Consistent with those findings, the CWQCC promulgated standards in Segment 3b which reflect the elevated background concentrations and the wider pH range documented in Segment 3a. EPA believes it has made its reliance on the CWQCC's work very apparent in the table on page 3-6 of HLPFFS (see the values for chronic copper and chronic iron).

EPA did not participate in the development of the NCLs. These negotiated numbers are not duly promulgated and they are not the result of applying site specific data to duly promulgated NPDES requirements (i.e. mass balance, low flow, etc.) to establish a discharge limit. The NCLs may indicate the appropriateness of a waiver at some time in the future, but at the present EPA will reserve judgement on the use of and scope of waivers.

The EPA believes that as an objective, the protection of the Alamosa River as habitat for a diverse range of cold water aquatic life is appropriate until the combined effects of the interim actions come into effect. Although it is impossible to precisely quantify, EPA believes that when the combined, beneficial effects of the IRODs are realized, ARARs be attained in Segment 3b of the Alamosa River.

At that time, EPA will be able to better quantify the results and determine if additional action or waiver is required. Likewise, the CWQCC will have another opportunity in three years to evaluate the results of the interim RODs and use its own use attainability authorities and ground water site-specific classifications to adjust standards accordingly.

2.5 Summary and Response to Reynolds and Chandler Adit Questions

Although the Reynolds and Chandler Adit system is not a part of the current focused feasibility studies, EPA recognizes the actual and potential contribution that this system may provide to overall AMD contamination at the Site. Of the four FFSs, the Adit system is of most importance to the Cropsy action since it is known that precipitation - approximately 72 million gallons per year - and ground water were funneled by the Mine Pits into the historic underground workings. The Adits previously drained this water (now ground water) from the mine workings which are interspersed throughout the sulfide ore body. Contact with the sulfide ore resulted in the transformation of the natural precipitation/ground water into AMD. This AMD then exited the Reynolds Adit and flowed into the Wightman Fork stream.

As part of ongoing emergency activities, it was determined that the continual generation of AMD from the Reynolds Adit could be substantially reduced by plugging the Adit system. (See Attachment F to Summitville Action Memorandum #2 dazed January 28, 1993.) This Would result in the re-establishment of the historic ground water table, thereby eliminating oxygen from the mine workings/Adits. Concurrent evaluation of alternatives to address the Cropsy Waste Pile included moving the CWP to the Mine Pits from which it was originally excavated. Overall evaluation of the two actions (Reynolds and CWP) strongly favored the filling and capping of the Mine Pits to prevent water infiltration through the sulfide ore body.

If the evaluation of the two actions had been unfavorable, it is likely that the Mine Pits would have needed to be regraded and a drainage notch constructed to reclaim the area. The movement of the waste piles to the Mine Pits, therefore, has actually resulted in a cost savings overall since the CWP remedy meets the needs of both portions of the Site. In addition, the reduction in volume of AMD generated by CWP and the Adits system will result in the decrease of Water Treatment required at the Site and, therefore, costs for this third action. Evaluation of the Adit plugs and the re-establishment of the groundwater table is ongoing and the information developed will be incorporated into RI/FS documents to support a separate Reynolds Adit/South Mountain ground water ROD.

The evaluation of the two actions was discussed in Attachment F of Action Memorandum #2 and section 5.0 of the EEdCA for the Cropsy Waste Pile, et al. An interim project report on the Reynolds and Chandler Adit plugs was released on October 12, 1994. Each of these documents is included as part of the Summitville Administrative Record and is available to the public.

Comment 1:
The discussion in all the FFSs regarding AMD concentrations/volumes attributed to various sources should have provided a detailed analysis of the chemical mass balances associated with water quality in and adjacent to

the property [Summitville Site].

Response:
As Tables 1-4 of the FFSs plainly demonstrate, there is not a steady release of chemicals over time with which to develop chemical mass balances. The bulk of the contaminants are released during periods of high surface water flow such as spring snowmelt or large storm events. As discussed in section 1.3.2.3 of the FFSs, such an attempt is further complicated by the varying nature of the geologic features encountered at the Site. To attempt to develop a chemical mass balance for each chemical and geologic feature for the various time frames does not add any greater understanding of the risks presented by the Site.

Comment 2:
There is concern associated with backfilling of the Mine Pits (with CWP, SDI, and BMD waste materials) since the data suggest that the Mine Pits and the Reynolds Adit are hydraulically interconnected. Because of this hydrogeological connection, a greater understanding regarding the geochemical interrelationship should have been undertaken prior to commencing backfilling activities.

The combined impacts of implementing these two actions is still unaddressed, despite the fact that the combined efforts could well be the reason that another or other alternatives would be preferred.

Response:
EPA agrees that the hydraulic interconnection between the Mine Pits and the Reynolds Adit is an area which bears special attention. If the ground water table - as a result of the Adit plugging - were to rise above the level of the Mine Pits, then the relocated waste piles could be subjected to a varying saturated condition. Because of this concern, EPA placed a continuous three-foot (finished thickness), highly-impermeable clay liner on the bottom and all sides of the Mine Pits. Placement and subsequent compaction by normal construction traffic of the waste piles appear to have resulted in impermeable waste piles. As a result, it is EPA's assessment that saturation of the relocated waste piles is unlikely to occur as a result of infiltration by the ground water table.

A final cap over the Mine Pits is intended to divert surface infiltration so that saturation of the piles does not occur as a result of precipitation events. The cap also serves to eliminate oxygen, which is required for AMD generation, from entering the waste pries.

As a precautionary measure, a continuous five-foot layer of lime kiln dust was placed over the clay liner for both the North and South Mine Pits (approximately 1,800 tons of lime kiln dust). The lime kiln dust is intended to neutralize any AMD generated as a result of moisture present within the waste piles as they are excavated and placed, and AMD generated by precipitation events occurring during construction. In addition, any surface water infiltration which may occur through the interim caps over the winters of 1993 and 1994 will also be neutralized.

Should the waste piles become saturated despite the design and construction safeguards described above, any AMD generation within the Mine Pits would take place under saturated conditions in a high pH environment (high pH as a result of dissolving the lime kiln dust). As with the Ore body, this saturation would result in the elimination of oxygen from the waste piles. This lack of oxygen would prevent the generation of AMD. While a more detailed geochemical discussion may be useful for actual design considerations, it can generally be understood that the sulfide ore body below the Mine Pits presents the highest AMD generating potential for the entire Site. If saturated conditions can minimized the AMD reaction for the sulfide ore body, then the same conditions will also minimize AMD reaction within the lesser sulfide-containing waste materials.

Comment 3:
This section [1.4.1.3 of the CWP FFS] indicated that the Reynolds and Chandler Adits have been plugged, but that the long term effects of plugging the Reynolds Adit and Chandler Adit, and the consequent rise in the South Mountain water table have not been determined.

EPA indicated in its response to comments on the EE/CA that a state-of-the-art groundwater flow model that accounts for flow in fractures is being developed in order to perform such evaluations. However, the Reynolds Adit was plugged prior to completion of such a groundwater flow model evaluation and any publication of results of such evaluations.

Response:
The intent of the "long term effects" statement was to convey that EPA does not definitively know the actual long-term effects which the plugging will achieve since plugging was only recently completed in March 1994. However, the referenced model has been able to provide an approximation of the resultant ground water table. At this time, a report on the findings of this model is in the final stages of review prior to its release to the public.

The development of the model was never expected to be completed prior to commencing plugging activities. Instead, it was anticipated that the model would be used to study the effects of changes in site conditions (i.e., removal/remedial actions) on the ground water and Adit system. The model has only recently achieved a relative level of accuracy and is now being evaluated based upon actual field conditions. Because the Adit pluggings were conducted as a time-critical, removal action, no formal public review process was required, though the alternatives analysis for the Reynolds Adit has been a part of the public record since January 28, 1993.

Comment 4:
Plugging of the Reynolds Adit should have been evaluated as a long-term solution at the Site rather than an Interim Remedial Action (IRA). Plugging of the Reynolds Adit could cause the following: (1) increase of the water table into the Mine Pits, (2) groundwater to exit the mountain via another shaft or adit (as was the case with the Chandler Adit), and/or (3) the creation of additional point sources of Acid Rock Drainage (ARD) through seeps.

Response:
As discussed previously, the Reynolds and Chandler Adits were plugged as a time-critical, emergency removal action. However, this does not imply that the plugging of the Adits is considered to be interim in nature. After initial consideration by EPA of the three potential effects as listed by the commenter, EPA felt it best to evaluate the impacts to the ground water table and the actual performance of the plugs as a whole system. As more about the South Mountain ground water regime is known, then a final decision regarding the regime can be developed for long-term considerations.

Comment 5:
EPA apparently has not performed adequate groundwater investigations to evaluate the short- and long-term effects of the Reynolds Adit plugging. Because of the complexity of the groundwater flow system at the Site, as related to fracture flow and the hydrogeologic significance of the mine workings and adits, a groundwater flow model is necessary to evaluate rises in the groundwater table and the potential for significant groundwater discharges through existing adits and shafts. Such modeling efforts must take into account the effects of fractures on groundwater flow characteristics, groundwater recharge primarily through the Mine Pits before and after filling and capping, groundwater discharge seeps, and other significant hydrogeologic boundary conditions such as the underground workings.

Response:
EPA agrees that the South Mountain ground water regime is complex in nature and can have significant impacts upon the various actions discussed for the Site. As a result, EPA has directed the development of a state-of-the-art, three-dimensional model with assistance from the Office of Surface Mining. Each of the parameters identified by the commenter and other considerations have been incorporated into development of the model. The model has only recently achieved a relative level of accuracy and is now being evaluated based upon actual field conditions. It is anticipated that the model can be developed into a predictive tool for evaluating future actions to be taken at the site.

Comment 6:
As anticipated by individuals commenting on the EE/CA, plugging of the Reynolds Adit in February 1994 apparently caused discharge of groundwater through the existing Chandler Adit thus providing another source of ARD. As a result, EPA plugged the Chandler Adit in March 1994. Shortly thereafter, the plug began leaking low pH metals-laden waters. An explanation for the failure of the Chandler Adit plug is not discussed in the FFS. Failure of the plug could be primarily a result of one or both of the following flaws in establishing the plug design parameters: 1) failure to use conservative hydraulic parameters, such as using the maximum possible hydrostatic head expected at the plug that would result from plugging of the Reynolds Adit; and 2) failure to select suitable competent rock for keying the plug. This section also mentions that corrective measures are planned for the Chandler Adit, however, no specific discussion of the nature of the contemplated corrective measures is provided.

Response:
Concerns regarding potential discharge from the Chandler Adit once the Reynolds Adit was plugged did result in EPA including plugging of the Chandler Adit as part of the removal action. However, the work for both Adits was conducted in a concurrent fashion and was not based upon actual discharge observed from the Chandler. The Chandler did not fail until May 23, 1994, which is a sufficient amount of time after construction for the plug to have been fully effective.

EPA agrees that the subsequent failure of the Chandler plug is likely to be associated with the plug design or the surrounding rock conditions. The corrective measures for the Chandler are not discussed primarily because the plug failure was still being evaluated. This assessment effort was initiated in November 1994 and it is anticipated that work to repair or replace the Chandler Adit will be completed by Spring 1995.

Comment 7:
EPA should not repeat the same mistake of replugging the Chandler Adit without performing the appropriate hydrogeologic investigations and evaluations. Replugging the Chandler Adit may cause, as was the case in the Reynolds Adit plug, water exiting out of another adit or shaft or significant hydrostatic pressures in the mountain that would cause the development of multiple point sources via seeps at the base of the mountain. As indicated above, the Chandler Adit is presently discharging low pH metals-rich waters directly into Wightman Fork. It is not known why EPA did not open the valve in the Reynolds Adit to reduce or preclude flow from exiting the Chandler Adit and treat this in the PITS facility prior to discharge to Wightman Fork. This demonstrates a failure on EPA's part to develop an overall environmental strategy at the Site, as opposed to a number of disconnected and uncoordinated individual actions.

From an emergency response standpoint, it may have been appropriate to keep the Reynolds Adit open since water from the Reynolds Adit could be readily treated.

Response:
Based upon the short success during the time that the Chandler Adit was functional, it is unlikely that replugging of the Adit will result in discharges from other adits. The ground water model being developed tends to support this conclusion. However, it is known that historic seeps did exist on South Mountain and it is reasonable to expect that these seeps would redevelop. Even so, the rationale for plugging the Adit system was to flood the mine workings and thereby eliminate oxygen from the reaction which generates AMD. This will result in the gradual improvement of the South Mountain ground water and, therefore, the water quality of the seeps.

The design for the Reynolds Adit included two separate plugs with piping between the plugs. A valve which would allow EPA to drain the water behind the two plugs was to be installed once the second plug was completed. After observing the better-than-expected performance from the first plug, EPA determined that a second plug would be a redundant expenditure and it was eliminated from construction. As a result, the capability to open the valve - as originally considered - did not exist at the time that the Chandler began to discharge to the Wightman Fork. This valving capability has since been installed and EPA has been treating the Chandler discharge at the PITS facility. Rather than a lack of an overall environmental strategy for the Site, this incident is more representative of the extreme physical and timing realities presented by the Site. Overall, discharge from the Chandler Adit produced less flow and less copper concentrations than experienced from the Reynolds Adit during the same time frame of the previous year.

Comment 8:
Plugging the Reynolds Adit may not, in the long term, reduce acid mine drainage flows and may turn out to be a very expensive experiment. Also, this interim action may actually exacerbate site problems and, thus conflict with the National Contingency Plan.

Base upon current data, gathering efforts and the recent predictive capability of the ground water model, EPA has determined that plugging of the Reynolds Adit will result in a reduction of contaminant transport from the Site. Therefore, these actions will not exacerbate Site problems or interfere with the final overall site remedy. However, should monitoring of the South Mountain ground water indicate that the plugging is actually exacerbating Site conditions, the (now installed) valve within the Reynolds Adit can be opened and treatment of the water initiated in the PITS.

Comment 9:
It is stated that "In 1993 and 1994, Emergency Response Removal Actions (ERRA) were taken to reduce contaminant load in untreated Site water. This was achieved in part by...prevention of AMD flow from underground workings..." Plugging the Reynolds Adit probably did not reduce the contaminant load in untreated Site water.

If no immediate reduction of contaminated water flows was expected, what was the rationale for the precipitous action in 1993 and 1994 regarding plugging of the Reynolds Adit? Alternative actions and consequences of combined actions could have been evaluated on sound scientific bases thus providing for recommended alternatives with higher expectations of achievements for interim remedies and final overall site remedies.

Response:
In the spring of 1993, discharge from the Reynolds Adit reached a peak flow of 763 gallons per minute with supersaturated concentrations of copper. Due to treatment capacity]imitations at the PITS facility, approximately 600 gallons per minute of the discharge overflowed the holding pond and escaped untreated into the ground or overflowed into the nearby creeks. While this occurred over a limited 34 week period, plugging of the Adits eliminated tiffs highly contaminated discharge to the Alamosa drainage during the 1994 spring season.

In general, each of the remedies discussed in the FFSs are anticipated to have a gradual impact upon water quality and cannot be guaranteed to dramatically improve conditions over a short time frame. Also, because of on-going water treatment, implementation of the remedies is expected to allow EPA to discontinue water treatment while maintaining compliance with current water quality standards.

Comment 10:
This section [1.4.4.2 of the CWPFFS] does not provide an adequate description of the groundwater flow conditions at the Site. A discussion of the prevailing groundwater flow systems should be provided, including the groundwater flow direction, permeabilities, and storage coefficients. Also, there is no discussion provided on the regional and local hydrogeologic boundary conditions at the Site. It is unclear where the recharge and discharge (seep) areas occur, and the hydrogeologic effect of the underground workings and their significance as a hydrogeologic boundary conditions are unknown. The text does not discuss how plugging of the Reynolds Adit will effect the groundwater table conditions at the Site. If these conditions are unknown, at least a qualitative description is necessary.

The FFS does not include a description of the promised state-of-the-art groundwater flow model that was supposedly developed to make these necessary evaluations. The model, as well as information on model assumptions, model hydrogeologic boundary conditions, should be included in an adequate FFS. The results of such modeling evaluations may significantly alter the conclusions of the FFS with regard to replugging the Chandler Adit. Such simulation would have provided insight into the water table levels which could affect conclusions regarding the effectiveness of the selected alternative.

In addition, EPA does not provide in the FFS a description of the proposed monitoring to determine the effectiveness of the plugging in the short- and long-term. Evaluating the effectiveness of the Reynolds Adit Plug will require monitoring of: (1) fluctuations in the water table; (2) existing seeps; (3) changes in flow quantity; and (4) changes in water quality through these seeps. Also, monitoring the development of additional seeps is critical Information regarding what EPA is currently considering as baseline for monitoring and what methods will be used to evaluate the effectiveness of plugging is necessary to determine the impact of plugging these two adits, particularly with regard to final site remediation. Further, information on the monitoring efforts currently being performed by EPA to monitor the potential development of additional seeps as a result of the Reynolds Adit plug, and the results of such monitoring, are critical to evaluate the effectiveness of the remedy.

Response;
EPA agrees that inclusion of the ground water model in an FS is essential to evaluating the effectiveness of a selected alternative for the South Mountain ground water regime. EPA also agrees that the results of monitoring for the various considerations outlined by the commenter are essential in assessing the impact of the Adit system plugging, particularly with regard to final Site remediation. However, the plugging of the Reynolds and Chandler Adits and their impact on the ground water are not the focus of any of the four FFSs provided for public review and inclusion of the suggested information in these FFSs is therefore inappropriate. Nonetheless, the modeling and monitoring efforts are actively being pursued and EPA anticipates that this information will be incorporated into future RI/FS documents to support a separate Reynolds Adit/South Mountain ground water ROD. These documents will be provided for public review and comment prior to remedy selection.

3.0 REFERENCES

ALL REFERENCE MATERIAL AVAILABLE IN THE EPA ADMINISTRATIVE RECORD

Table 1 Copper Content - Site Contaminated Water, 1993-1994 Record

1993/1994 ENVIRONMENTAL ANALYSIS-SUMMITVILLE SUPERFUND SITE
COPPER (LBS)

SAMPLE LOCATION	1993 MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	1994 JAN	FEB	MAR	APR	MAY	JUN	JULY TO JUNE COPPER LOAD (LBS)	PERCENT OF CURRENT LOADING	PERCENT OF POTENTIAL LOADING
FRENCH DRAIN SUMP																	
STREAM A	553	1,121	831	522	1,688	563	414	417	463	409	361	354	508	2,150	8,679		
VALLEY CENTER DRAIN																	
FDS-1	1,136	1,418	282	181	198	120	147	122	104	63	50	37	532	1,601	3,434		
DIKE 1 SEEP																	
FDS-2	12	384		18	35	36	22	16					54	302	483		
LPD-1 & ROAD SEEPS																	
FDS-3	827	314	51	34	46	37	28	28	23	17	18	139	258	79	757		
LPD-4 & 5 COMBINED																	
FRENCH DRAIN SUMP	3,191	3,940	1,923	1,513	899	829	481	482	438	374	391	492	2,238	2,410	12,269		2.72%
TOTAL FLOW																	
HEAP LEACH PAD																	
STREAM B	8,346	4,037	791	333	349	146	76	25	4				1,191	1,464	4,378		0.97%
CWP OVERFLOW (550-DO)																	
CROPSY WATER											2,843	1,840	7,411	6,833	18,927		4.20%
(TREATMENT PLANT)																	
HLP LEACHATE	39,364	37,966	33,162	24,688	22,708	21,802	19,035	16,082	13,673	9,334	9,047	7,835	6,103	9.019	192,488		42.75%
(INFLUENT TO CDP)																	
UNDERGROUND WORKINGS																	
STREAM C	53,242	110,739	34,432	20,212	19,272	12,352	6,963	5,319	2,663	142	112	86		1,126	102,679	12.76%	22.80%
REYNOLDS ADIT (AD-O)																	
PITS	12,770	15,551	19,750	18,472	19,272	12,352	6,963	5,319	2,662	94	140	154	0	0	85,178		
(REYNOLDS ADIT TREATMENT)																	
CHANDLER PORTAL													11,754	83,788	95,542	69.63%	21.22%
CROPSY CREEK																	
LPD-2	281	198	31	59	34	28	7	0					194	268	621		
(EAST OF F.D. SUMP)																	
STREAM H	3,624	850	127	111	67	52	26	21	21	15	25	159	542	571	1,737	1.27%	0.39%
CROPSY CREEK																	
POND 4																	

STREAM F	0	761	406	728	323	78	6						1,002	1,965	4,508	3.29%	1.00%
POND 4 DISCHARGE																	
IDWA ADIT													37	223	N/M		
OTHER CONTRIBUTORS TO WIGHTMAN FORK																	
STREAM D	4,436	3,904	1,287	1,788	1,525	873	609	644					458	5,110	12,294	8.96%	2.73%
CLEVELAND CLIFFS																	
STREAM E	3,389	3,455	866	97	31	4							1,513	1,810	4,321	3.15%	0.96%
NORTH DUMP DRAINAGE																	
STREAM G	2,305	1,028											876	237	1,113	0.81%	0.25%
CLAY ORE STOCKPILE (SEEP L)																	
TREATMENT DISCHARGE	23	45	31	22	28	32	21	13	11	0	0	0	6	24	189	0.14%	0.04%
TO WIGHTMAN FORK																	
MONTHLY TOTAL OF	54,249	105,231	17,399	4,486	1,974	1,039	662	679	33	63	-3	92	16,151	94,630	137,204	100.00%	
CURRENT CONTRIBUTORS																	
MONTHLY TOTAL OF ALL	117,897	166,680	72,994	49,470	45,173	35,935	27,196	22,574	16,798	9,865	12,417	10,412	33,088	114,332	450,256		100%
POTENTIAL CONTRIBUTORS																	
WF-5.5 WIGHTMAN FORK	47,436	71,161	20,548	6,424	3,662	938	780	676	479	374	300	909	20,424	87,450	143,092		

Table 2 Cyanide Content - Site Contaminated Water, 1993-1994 Record

1993/1994 ENVIRONMENTAL ANALYSIS-SUMMITVILLE SUPERFUND SITE

CYANIDE

SAMPLE LOCATION	1993 MAY	JUN	JULY	AUG	SEPT	OCT	NOV	DEC	1994 JAN	FEB	MAR	APR	MAY	JUN	JULY TO JUNE CYANIDE LOAD (LBS)	PERCENT OF CURRENT LOADING	PERCENT OF POTENTIAL LOADING
FRENCH DRAIN SUMP																	
STREAM A	450	542	955	453	245	392	564	699	645	522	420	509	591	399	6,415		
VALLEY CENTER DRAIN																	
FDS-1	49	38	18	7	7	7	14	6	3	2	1	0	5	14	81		
DIKE 1 SEEP																	
FDS-2	8	112		20	8	28	12	17					5	12	102		
LPD-1 & ROAD SEEPS																	
FDS-3	0	0	0	2	0	0	0	0	0	0	0	0	0	0	2		
LPD-4 & 5 COMBINED																	
FRENCH DRAIN SUMP	1,245	1,216	1,027	1,198	636	476	496	514	496	429	464	530	599	486	7,348		4.42%
(EFFLUENT)																	
HEAP LEACH PAD																	
STREAM B	0	0	0	0	0	0	0	0	0				0	0	0		
CWP OVERFLOW (550-DO)																	
CROPSY WATER (TREATMENT PLANT)											0	0	0	0	0		
HLP LEACHATE	34,185	29,091	25,667	17,914	16,592	16,761	16,779	14,655	13,382	8,812	8,637	7,264	6,229	8,125	158,717		95.54%
(INFLUENT TO CDP)																	
UNDERGROUND WORKING																	
STREAM C	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00%	0.00%
REYNOLDS ADIT (AD-0)																	
PITS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00%	
(REYNOLDS ADIT TREATMENT) CHANDLER PORTAL													0	0	0	0.00%	0.00%
CROPSY CREEK																	
LPD-2 (EAST OF F. D. SUMP)	0	0	0	0	0	0	0	0						0	0		
STREAM H	26	104	1	17	3	0	15	0	0	1	0	1	9	7	54	6.86%	0.03%
CROPSY CREEK																	
POND 4																	
STREAM F	0	0	0	0	0	8	0						0	0	8	1.02%	0.00%

POND 4 DISCHARGE																	
IDWA ADIT														0	N/M		
OTHER CONTRIBUTORS TO WIGHTMAN FORK																	
STREAM	1	0	0	0	0	0	0	0					0	0	0	0.00%	0.00%
CLEVELAND CLIFFS																	
STREAM E	0	0	0	0	0	0								0	0	0.00%	0.00%
NORTH DUMP DRAINAGE																	
STREAM G	0	0											0	0	0	0.03%	0.00%
CLAY ORE STOCKPILE (SEEP L)																	
TREATMENT DISCHARGE	153	164	200	74	83	99	54	43	16	0	0	0	36	117	722	92.09%	0.43%
TO WIGHTMAN FORK																	
MONTHLY TOTAL OF	180	268	201	91	85	107	70	43	16	1	1	1	45	124	784	100.00%	
CURRENT CONTRIBUTORS																	
MONTHLY TOTAL OF ALL	35,457	30,411	26,595	19,129	17,230	17,245	16,289	15,169	13,878	9,241	9.101	7,794	5,838	8,618	166,127		100%
POTENTIAL CONTRIBUTORS																	
WF-5.5 WIGHTMAN FORK	1,518	1,328	228	405	187	32	154	155	95	0	0	22	280	2,998	4,536		

Table 3a Site Surface Water and Treatment Plant Flow Rates, 1993-1994 Record

1993/1994 ENVIRONMENTAL ANALYSIS-SUMMITVILLE SUPERFUND SITE
FLOW RATE (GPM)

SAMPLE LOCATION	1993 MAY	JUN	JULY	AUG	SEP	OCT	NOV	DEC	1984 JAN	FEB	MAR	APR	MAY	JUN	HIGH FLOW (GPM) (7/93 TO 6/94)	LOW FLOW (GPM) (7/93 TO 6/94)
FRENCH DRAIN SUMP																
STREAM A	58	57	72	59	62	71	70	74	73	70	70	78	132	119	132	59
VALLEY CENTER DRAIN																
FDS-1	40	29	8	5	5	3	4	3	1	1	1	1	14	38	38	1
DIKE 1 SEEP																
FDS-2	1	19		3	3	3	3	2					4	20	20	2
LPD-1 & ROAD SEEPS																
FDS-3	25	25	14	12	12	13	11	10	7	6	5	5	10	13	14	5
LPD-4 & 5 COMBINED																
FRENCH DRAIN SUMP	151	190	124	103	95	70	70	70	70	70	70	87	185	161	185	70
(EFFLUENT)																
HEAP LACH PAD																
STREAM B	364	191	47	18	15	8	4	2	0				28	44	47	0
CWP OVERFLOW (550-DO)																
CROPSY WATER											108	74	176	162	176	74
(TREATMENT PLANT)																
HLP LEACHATE	594	723	677	566	647	774	674	639	650	621	648	661	534	750	774	534
(INFLUENT TO CDP)																
UNDERGROUND WORKINGS																
STREAM C	486	763	398	272	229	180	119	97	46	9	7	6		58	398	6
REYNOLDS ADIT (AD-O)																
PITS	74	113	192	218	237	180	119	97	69	67	72	86	0	0	237	0
REYNOLDS ADIT TREATMENT																
CHANDLER PORTAL													369	571	571	369
CROPSY CREEK																
LPD-2	26	28	2	5	2	2							31	29	29	2
(EAST OF F.D. SUMP)																
STREAM H	2,805	2,508	643	327	239	104	69	62	52	36	41	89	1,346	2,450	2,450	36
CROPSY CREEK																
POND 4																

STREAM F		766	115	318	138	33	4						948	766	948	4
POND 4 DISCLOSURE																
IOWA ADIT													20	134	N/M	N/M
OTHER CONTRIBUTORS TO WIGHTMAN FORK																
STREAM D	202	168	52	83	59	43	33	37					109	168	168	33
CLEVELAND CLIFFS																
STREAM E	284	282	67	13	4	2							254	314	314	2
NORTH DUMP DRAINAGE																
STREAM G	40	66											37	41	41	37
CLAY ORE STOCKPILE (SEEP L)																
MONTHLY TOTAL OF	3,752	4,440	1,083	795	440	182	106	99	52	36	41	89	3,063	4,366	4,366	36
CURRENT CONTRIBUTORS																
MONTHLY TOTAL OF ALL	4,935	5,657	2,123	1,700	1,426	1,214	973	907	818	736	874	917	3,986	5,484	5,484	736
POTENTIAL CONTRIBUTORS																
WF-5.5 WIGHTMAN FORK	15,558	13,623	3,353	2,238	1,131	695	708	493	344	233	295	1,279	10,483	12,526	12,526	233

Table 3b Site Surface Water and Treatment Plant Water Volume

1993/1994 ENVIRONMENTAL ANALYSIS-SUMMITVILLE SUPERFUND SITE
FLOW (GALLONS)

HIGH FLOW LOW FLOW
SAMPLE MAY `93 JUN`93 JULY `93 AUG `93 SEP `93 OCT `93
NOV `93 DEC `93 JAN `94 FEB `94 MAR `94 APR `94 MAY `94 JUN `94
(GALLONS) (GALLONS)
LOCATION

(7/93 TO 6/94) (7/93 TO 6/94)

FRENCH DRAIN SUMP

STREAM A 2,589,120
2,462,400 3,214,080 2,633,760
2,678,400 3,169,440 3,024,000
3,303,360 3,258,720 2,822,400
3,124,800 3,369,600 5,892,480
5,149,440 5,892,480 2,633,760

VALLEY CENTER DRAIN

FDS-1 1,765,600
1,252,800 357,120 223,200
216,000 133,920 172,800
133,990 44,640 40,320 44,640
43,200 624,950 1,637,280
1,637,280 40,320

DIKE 1 SEEP

FDS-2 44,640
820,800 133,920
129,600 133,920 129,600
89,820
178,560 846,720 846,720
89,280

LPD-1 & ROAD SEEPS

FDS-3 1,118,000
1,080,000 624,960 513,360
518,400 580,320 475,200
446,400 312,480 241,920 223,200
216,000 446,400 540,000
624,960 216,000

LPD-4 & 5 COMBINED

FRENCH DRAIN SUMP 6,740,640
8,208,000 5,535,360 4,597,920
4,104,000 3,124,800 3,024,000
3,124,800 3,124,800 2,822,400
3,124,800 3,758,400 8,258,400
6,955,200 8,258,400 2,822,400

(EFFLUENT)

HEAP LEACH PAD

STREAM B 16,248,960
8,251,200 2,098,080 803,520
648,000 357,120 172,800

89,280 0
1,249,920 1,918,080 2,098,080
0

CWP OVERFLOW (550 DO)

CROPSY WATER
4,821,120
3,195,800 7,856,640 6,998,400
7,656,640 3,196,800

(TREATMENT PLANT)

HLP LEACHATE 26,516,160
31,233,600 30,221,280 25,266,240
27,950,400 34,551,400 29,116,800
28,524,960 29,016,000 25,038,720
28,926,720 28,555,200 23,837,760
32,400,000 34,551,360 23,837,760

(INFLUENT TO CDP)

UNDERGROUND WORKINGS

STREAM C 21,695,040
32,961,600 17,766,720 12,142,080
9,692,800 8,035,200 5,140,800
4,330,080 2,035,584 351,850
305,021 244,080
2,496,960 17,766,720 244,080

REYNOLDS ADIT (AD-O)

PITS 3,303,360
4,881,600 8,570,880 9,731,520
10,238,400 8,035,200 5,140,800
4,330,080 3,080,160 2,701,440
3,214,080 3,214,080 0
0 10,238,400 0

REYNOLDS ADIT TREATMENT

CHANDLER PORTAL

16,472,160 24,654,240 24,654,240
16,472,160

CROPSY CREEK

IPD-2 1,60,540
1,209,600 89,280 223,200
86,400 89,280
580,320 1,252,800 1,252,800
85,400

(EAST OF F.D. SUMP)

STREAM H 125,215,200
108,345,600 28,703,520 14,597,280
10,324,800 4,642,560 2,980,800
2,767,680 2,231,280 1,451,520
1,830,240 3,844,800 60,085,440
105,831,360 105,831,360 1,451,520

CROPSY CREEK

POND 4

STREAM F 0
33,091,200 5,135,600 14,195,520
5,961,600 1,473,120 172,800
42,318,720 33,069,600 42,318,720
172,800

POND 4 DISCHARGE

IOWA ADIT

892,800 5,771,520 N/A
N/A

OTHER CONTRIBUTORS TO WIGHTMAN FORK

STREAM D 9,017,280
7,257,600 2,231,280 3,705,120
2,548,800 1,919,520 1,425,600
1,651,680
4,865,750 7,245,504 7,245,504
1,425,600

CLEVELAND CLIFFS

STREAM E 12,677,760
12,182,400 2,990,880 580,320
172,800 66,960
11,338,560 13,564,800 13,564,800
66,960

NORTH DUMP DRAINAGE

STREAM G 2,187,360
2,851,200
1,651,680 1,753,920
1,753,920 1,651,680

CLAY ORE STOCKPILE (SEEP L)

MONTHLY TOTAL OF 167,489,280
191,808,000 48,345,120 35,488,800
19,008,000 8,102,160 4,579,200
4,419,360 2,231,280 1,451,520
1,830,240 3,844,800 136,732,320
188,616,384 188,616,384 1,451,520

CURRENT CONTRIBUTORS

MONTHLY TOTAL OF ALL 220,298,400
244,382,400 94,770,720 75,888,000
61,603,200 54,170,840 42,033,600
40,488,480 36,497,664 29,675,520
39,008,432 39,599,280 177,935,040
236,888,064 236,888,054 29,675,520

POTENTIAL CONTRIBUTORS

WF-5.5 WIGHTMAN FORK 694,509,120
588,513,600 149,677,920 103,921,920
48,859,200 31,002,480 30,585,600
22,007,620 15,356,160 9,394,560
13,168,000 55,252,800 487,981,120
541,105,920 541,105,920 9,394,550

Table 4

**Contaminant Content at High and Low Flows -
Identified AMD Streams**

Stream:	Stream A	Stream B	Stream C	Stream D	Stream E	Stream F	Stream G
Recording Date							
High Flow	12/08/93	5/24/93	6/10/93	6/02/93	6/08/93	6/02/93	6/15/93
Low Flow	9/08/93	12/16/93	5/13/93	11/05/93	9/21/93	6/10/93	11/17/93
GPM							
High	74.4	597.5	910	348	283	105	1176
Low	62.1	1	74	19	1	24	0.5
Manganese Total Recoverable							
High	56.6	72	35.2	72	40	55.5	10
Low	28.61	63.54	15.4	66.09	16.6	54.75	65.53
Iron TR							
High	297.6	1240	1738	636	447.5	2157.1	109.25
Low	438.1	793	368.4	310.8	76.88	800	26.21
Total Cyanide							
High Flow	25.25	NR	NR	0.017	NR	<.01	<.01
Low Flow	10.95	NR	NR	<.01	NR	<.01	<.01

Aluminum and Zinc Content at High and Low Flows -
Identified AMD Streams

Stream:	Stream A	Stream C	Stream D	Stream E	Stream F	Stream G	Stream H	FD-I
Recording Date:								
High Flow		6/22/94	6/20/94			No Information Available		6/21/94
Low Flow	2/25/94	5/01/94	5/03/94					
Zinc digested								
High		101	9.73					105
Low	15.98	64.1	4.99					
Aluminum dig								
High		1644	154.5					992.1
Low	43	967.3	60.78					

All concentrations - mg/l
NR - Not Recorded

IMG SRC 0895095
IMG SRC 0895095A

Table 7
Potential Chemical Specific ARARs

Standards, Requirements, Criteria, Limitations	Citation	Description	Potentially Applicable or Relevant and Appropriate	Comment
GROUNDWATER;				
National Primary Drinking Water Standards	40 C.F.R, Part 141, Subpart B pursuant to 42 U.S.C. §§ 300g-1 and 300j-9. State: 5 CCR 1003-1 pursuant to C.R.S. § 25-1-107(l)(x).	Establishes numeric standards for public water systems. Maximum contaminant levels (MCLs) are established to Protect human life with drinking water exposure.	No	No public water supplies are present, the State of Colorado has comprehensive ground-water classification system, including numeric standards equivalent to (MCLs). See section 3.2.1.
National Secondary Drinking Water Standards	40 C.F.R. Part 143, pursuant to 42 U.S.C. §§ 300g-1(c) and 300j-9	Establishes aesthetics-related standards for public water systems (secondary maximum contaminant level).	No	Protects aesthetic character, not relevant to protection of human health or environment.
Maximum Contaminant Level Goals	40 C.F.R. Part 141, Subpart F, pursuant to 42 U.S.C. § 300g-1	Establishes drinking water quality goals set at levels of no known or anticipated adverse healths effects, with an adequate margin of safety.	No	No non-zero MCLGs set at levels less than MCLs were identified for contaminants of concern.
Colorado Ground Water Standards	State: 5 CCR 1002-8 §§ 3.1.1.0 - 3.11.8	Establishes a scheme for identifying groundwater specified areas, for classification of Colorado ground water and provides numeric standards. Also, establishes an interim narrative standard for all unclassified ground water, supplementing statewide standards.	Applicable	See section 3.2.1.

Table 7 (continued)
Chemical Specific Criteria To-Be-Considered (TBC)

Standards, Requirements, Criteria, Limitations	Citation	Description	Potentially Applicable or Relevant and Appropriate	Comment
RCRA Groundwater Protection Standard (RCRA GPS)	40 CFR §§ 264.92 - 264.101 State: 6 CCR 1007-3	Establishes standards for ground water quality related to RCRA hazardous waste facilities,	No	The State of Colorado has comprehensive ground-water classification system, including numeric standards equivalent to MCLs and RCRA GPS.
SURFACE WATER: Colorado Water Quality Standards	State: 5 CCR 1002-8, §§ 3.1.0 - 3.1.17	Establishes standards and classifications for Colorado surface waters.	Applicable	See section 3.1.1.
Federal Water Quality Criteria	40 C.F.R. Part 131 Quality Criteria for Water, 1986, pursuant to 33 U.S.C. § 1314	Sets criteria for surface water quality based on toxicity to aquatic organisms and human health.	Relevant and Appropriate	See section 3.1.2.
National Primary and Secondary Ambient Air Quality Standards	40 C.F.R. Part 50, pursuant to 42 U.S.C. § 7409. State: C.R.S. § 25-7-108, 5 CCR 1001-14.	Establishes standards for ambient air quality to protect public health and welfare (including standards for particulate matter and lead).	Applicable	See section 3.4.
National Emission Standards for Hazardous Air Pollutants	40 C.F.R. Part 61, Subparts N, O, P pursuant to 42 U.S.C. § 7412. State: C.R.S. § 25-7-108, 5 CCR 1001-10	Sets emission standards for designated hazardous pollutants.	No	Air emissions are not anticipated after construction activities are complete. See section 3.4.

Table 7 (continued)
Chemical Specific Criteria To-Be-Considered (TBC)

Advisories to be Considered and Guidance	Citation	Description	To Be Considered	Comment
SOILS:				
Toxic Substances Control Act, PCB Spill Cleanup Policy	52 FR 10688 April 2, 1987	Establishes guidance cleanup levels for PCB contaminant soils.	Not considered	There is no evidence that PCB spills have occurred.
Interim Guidance on Establishing Soil Lead Cleanup Levels at Superfund Sites	EPA Directive #9355.4-02, September 1989.	Established guidance cleanup levels for lead contaminated soils.	Considered	See section 3.3.

Table 7 (continued)
Potential Action Specific ARARs

Potentially Applicable or Relevant and Appropriate	Citation	Description	Potentially Applicable or Relevant and Appropriate	Comment
SOLID WASTE DISPOSAL ACT ("SWDA")				
Guidelines for the Thermal Processing of Solid Wastes	40 C.F.R. Part 240, pursuant to 42 U.S.G. § 6901, et seq.	Prescribes guidelines for thermal processing of municipal solid wastes.	No	Thermal processing will not occur.
Guidelines for the Land Disposal of Solid Wastes	40 C.R.S. Part 241, pursuant to 42 U.S.C. § 6901, et. seq.	Establishes requirements and procedures for land disposal of solid wastes.	No	Disposal of mine wastes and closure of mines are specifically addressed by the Colorado Mined Land Regulations. See section 4.2.
Colorado Regulations Pertaining to Solid Waste Disposal Sites and Facilities	State: 6 CCR 1007-2, pursuant to C.R.S. § 30-20-101 and C.R.S; §30-20-102, et seq.	Establishes requirements and procedures for land disposal of solid wastes and the siting of disposal facilities.	No	Disposal of mine wastes and closure of mines are specifically addressed by the Colorado Mined Land Regulations. See section 4.2
Guidelines for the Storage and Collection of Residential, Commercial, and Institutional Solid Waste	40 C.F.R. Part 243, pursuant to 42 U.S.C. § 6901, et seq.	Establishes guidelines for collection of residential, commercial, and institutional solid wastes.	No	Not relevant.
Source Separation for Materials Recovery Guidelines	40 C.F.R. Part 246, pursuant to 42 U.S.C. § 6901, et seq.	Establishes requirements and recommended procedures for source separation by federal agencies of residential, commercial, aud institutional solid wastes.	No	Not relevant. Creates no substantive cleanup requirements.

Table 7 (continued)
Potential Action Specific ARARs

Potentially Applicable or Relevant and Appropriate	Citation	Description	Potentially Applicable or Relevant and Appropriate	Comment
Guidelines for Development and Implementation of State Solid Waste Management Plans	40 C.F.R. Part 256, pursuant to 42 U.S.C. § 6901, et seq.	Establishes requirements for federal approval of state programs to regulate open dumps.	No	Creates no substantive cleanup requirements.
Criteria for Classification of Solid Waste Disposal Facilities and Practices	40 C.F.R. Part 257, pursuant to 42 U.S.C. § 6901, et. seq.	Establishes criteria for solid waste disposal facilities and practices.	No	Disposal of mine wastes and closure of mines are specifically addressed by the Colorado Mined Land Regulations. See section 4.2.
Hazardous Waste Management System: General	40 C.F.R. Part 260 State: 6 CCR 1007-3 Part 260	Establishes procedures and criteria for modification or revocation of any provision in parts 260-265.	No	Creates no substantive cleanup requirements.
Identification and Listing of Hazardous Waste	40 C.F.R. Part 261, pursuant to 42 U.S.C. § 6921 State: 6 CCR 1007-3 Part 261, pursuant to C.R.S. ,§ 25-15-302	Defines those solid wastes which are subject to regulation as hazardous wastes under 40 C.F.R. Parts 262-265 and Parts 124, 270, 271.	Applicable	Provides for the identification of hazardous wastes; used to determine disposal criteria for sludges & spent process chemicals generated from water treatment.
Standards Applicable to Generators of Hazardous Waste	40 C.F.R. Part 262, pursuant to 42 U.S.C. § 6922 State: 6 CCR 1007-3 Part 262, pursuant to C.R.S. § 25-i 5-302	Establishes standards for generators of hazardous waste.	Applicable	If hazardous waste are generated onsite and managed offsite the requirements are applicable. Used to handle process chemicals and sludge management for water treatment.

Table 7 (continued)
Potential Action Specific ARARs

Potentially Applicable or Relevant and Appropriate	Citation	Description	Potentially Applicable or Relevant and Appropriate	Comment
Standards Applicable to Transporters of Hazardous Waste	40 C.F.R. Part 263, pursuant to 42 U.S.C. § 6923 State: 6 CCR 1007-3 Part 263, pursuant to C.R.S. § 25-15-302, 4 CCR 223-18	Establishes standards which apply to persons transporting hazardous waste within the U.S. if the transportation requires a manifest under 40 C.F.R. Part 262.	Applicable	If hazardous wastes are transported offsite the requirements are applicable.
Standards for Owners and Operators of hazardous Waste Treatment, Storage, and Disposal Facilities	40 C.F.R. Part 264, pursuant to 42 U.S.C. § 6924, 6925 State: 6 CCR 1007-3 Part 264, subparts B, C, D, E, F, G, K, L, and N, pursuant to C.R.S. § 25-15-302	Establishes standards which define the acceptable management of hazardous waste for owners and operators of facilities which treat, store, or dispose of hazardous waste.	Yes	See section 4.1.
Interim Standards for Owners an Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities	40 C.F.R. Part 265 State: 6 CCR 1OO7-3, Part 265	Establishes standards for management of hazardous waste during interim status.	Relevant and Appropriate	Establishes no substantive standards applicable or relevant and appropriate to the IILP.
Standards for the management of Specific hazardous Wastes and Specific Types of Hazardous Waste Management Facilities	40 C.F.R. Part 266 State: 6 CCR 1007-3, Part 267	Establishes requirements which apply to recyclable materials that are reclaimed to recover economically significant amounts of precious metals, including gold and silver.	No	Not relevant to activities at the site.
Interim Standards for Owners and Operators of New Hazardous Waste Land Disposal Facilities	40 C.F.R. Part 267 State: 6 CCR 1007-3, Part 267	Establishes minimum national standards that define acceptable management of hazardous waste for new land disposal facilities.	No	Part 267 regulations are no longer effective after February 13, 1983,

Table 7 (continued)
Potential Action Specific ARARs

Potentially Applicable or Relevant and Appropriate	Citation	Description	Potentially Applicable or Relevant anti Appropriate	Comment
Hazardous Waste Permit Program	40 C.F.R. Part 270 State; 6 CCR 1007-3, Part 100	Establishes provisions covering basic EPA permitting requirements.	No	A permit is not required for onsite CERCLA response actions.
Underground Storage Tanks	40 C.F.R. Part 280	Establishes regulations related to underground storage tanks.	No	The use of or remediation of underground storage tanks is not anticipated.
SAFE DRINKING WATER ACT				
Underground injection Control Regulations	40 C.F.R. §§ 144.12. 144.24, and 144.25, pursuant to 42 U.S.C. § 121 (e)(1)	Establishes requirements for injection of waste water into wells and aquifers.	No	Underground injection not anticipated.
CLEAN WATER ACT				
National Pollutant Discharge Elimination System	40 C.F.R. Parts 122, 125 pursuant to 33 U.S.C. § 1342 5 CCR 1002-2, §§ 6.1.0 to 6.1.8.0, pursuant to C.R.S.: § 25-8-501	Requires permits for the discharge of pollutants from any point source into waters of the United States including stormwater.	Applicable	See sections 4.3 and 4.4
Amendment to the Settlement of July 1, 1991	July 21, 1992 agreement between Co. Mined Reclamation Board, Co. Mined Reclamation Division, CO. Water Quality Control Division, the Executive Director of the CDPHE and the SCMCI	Establishes Numerical Criteria Limits for water quality for outfall 004 (WF5.5) an a compliance plan	Considered	
Effluent Limitations	40 C.F.R. Part 440, pursuant to 33 U.S.C. § 1311 5 CCR 1002-3, §§ 10.1 to 10.1.7, pursuant to C.R.S. § 25-8-503	Sets technology-based effluent limitations for point source discharges in tho Ore Mining and Dressing Point Source category. Also provides exemption for release of storm water where defined BMP criteria are implemented.	Relevant and Appropriate	See section 4.3.

Table 7 (continued)
Potential Action Specific ARARs

Potentially Applicable or Relevant and Appropriate	Citation	Description	Potentially Applicable or Relevant and Appropriate	Comment
National Pretreatment Standards	40 C.F.R. Part 403, pursuant to 33 U.S.C. § 1317	Sets standards to control pollutants which pass through or interfere with treatment processes in publicly owned treatment works or which may contaminate sewage sludge.	No	No discharge to a publicly owned treatment works is anticipated.
Toxic Pollutant Effluent Standards	40 C.F.R. Part 129, pursuant to 33 U.S.C. § 1317	Establishes effluent standards or prohibitions for certain toxic pollutants: aldrin/dieldrin, DDT, endrin, toxaphene, benzidine, PCBs.	No	Tile discharge of specified pollutants is not anticipated.
Dredge or Fill Requirements (Section 404)	40 C.F.R. Parts 230, 231 33 C.F.R. Part 323, pursuant to 33 U.S.C. § 1344	Requires permits for discharge of dredged or fill material into navigable waters.	No	No construction activities are applicable involving dredging in water treatment.
Marine Protection, Research & Sanctuary Act	13 U.S.C. §§ 1401-1445	Regulates ocean dumping.	No	Ocean dumping will not occur.
Toxic Substances Control Act PCB Requirements	15 U.S.C. § 2605(c) 40 C.F.R. Part 761	Establishes disposal requirements for PCBs	No	At this time it is not anticipated that remedial activities will involve the disposal of PCBs.
Uranium Mill Tailings Radiation Control Act	42 U.S.C. §§ 7901-7942 42 U.S.C. § 2022	Establishes requirements related to uranium mill tailings.	No	Uranium mill tailings are not present at the site.
Surface Mining Control and Reclamation Act	30 U.S.C. §§ 1201-1328	Establishes provisions designed to protect the environment from the effects of surface coal mining operations.	No	Not relevant. Creates no substantive cleanup requirements.

Table 7 (continued)
Potential Action Specific ARARs

Potentially Applicable or Relevant and Appropriate	Citation	Description	Potentially Applicable or Relevant and Appropriate	Comment
Occupational Safety and Health Act	29 U.S.C. §§ 651-678	Regulates worker health and safety.	No	While not an ARAR, these requirements will apply during implementation of remedies at the site.
Federal Mine Safety and Health Act	30 U.S.C. §§ 801-962	Regulates working conditions in underground mines to assure safety and health of workers.	No	While not an ARAR, the requirements will be met if it becomes necessary to access underground mine workings.
Hazardous Materials Transportation Act, D.O.T. Hazardous Materials Transportation Regulations	49 U.S.C. §§ 1801-1813, 49 C.F.R. Parts 107, 171-177	Regulates transportation of hazardous materials	Applicable	If hazardous materials are transported offsite these regulations will be attained. Will apply to sludges or spent or process chemicals if determined hazardous.
Colorado Noise Abatement Statute	State: C.R.S. §§ 25-12-101, et seq.	Establishes standards for controlling noise.	No	While not an ARAR, applicable standards will be met during construction activities at the Summitville site.
Colorado Mined Land Reclamation Act	State: C.R.S. § 34-32*101 et seq. and regulations, 2 CCR 407-1	Regulates all aspects of mining, including location of operations, reclamation, and other environmental and socioeconomic impacts.	Yes	See section 4.6.

Table 7 (continued)
Potential Action Specific ARARs

Potentially Applicable or Relevant and Appropriate	Citation	Description	Potentially Applicable or Relevant and Appropriate	Comment
National Historic Preservation Act	16 U.S.C. § 470 40 C.F.R. § 6,301(b) 36 C.F.R. Part 800 State: C.R.S. §§ 24-80-101-108	EPA must account for the affects of any action on any properly wills historic, architectural, archeological or cultural value that is listed or eligible for listing on the National Register of Historic Places, or the Colorado Register of Historic Places.	Applicable	A survey will be perform so that the Colorado State Historic Preservation Officer may determine if parts of the site are eligible for inclusion on the State National registers. (See section 5.2).
Archeological and Historic Preservation Act of 1974	16 U.S.C. § 469 40 C.F.R. § 6.301 (c)	Establishes procedures to preserve historical and archeological data which might be destroyed through alteration of terrain as a result of a federal construction project or a federally licensed activity or program.	Applicable	A survey will be perform to identify data that requires protection during remedial activities.
Historic Sites Act of 1935, Executive Order 11593	16 U.S.C. §§ 461 et seq. 40 C.F.R. § 6.301(a)	Requires federal agencies to consider the existence and location of landmarks on the National Registry of Natural Landmarks to avoid undesirable impacts on such landmarks.	Applicable	A survey will be performed to identify potential natural landmarks.
Colorado Wildlife Enforcement and Penalties	State: C.R.S. §§ 33-1-101, et seq.	Prohibits actions detrimental to wildlife.	Applicable	During the design phase the remedy, consideration will be given to the protection of wildlife.

Table 7 (continued)
Potential Action Specific ARARs

Potentially Applicable or Relevant and Appropriate	Citation	Description	Potentially Applicable or Relevant and Appropriate	Comment
Wildlife Commission Regulations	State: 2 CCR 405-0	Establishes specific requirements for protection of wildlife.	Applicable	During the design phase of the remedy, requirements for the protection of wildlife will be met in the Summitville Mine area.
Fish and Wildlife Coordination Act	16 U.S.C. §§ 661-666 40 C.F.R. § 6.302(g)	Requires consultation when federal department or agency proposes or authorizes any modification of any stream or other water body to provide for adequate provision for protection of fish and wildlife resources.	Applicable	Prior to modification of water bodies appropriate agencies will be consulted. See section 5.1.
Endangered Species Act	16 U.S.C. §§ 1531-1543. 50 C.F.R. Parts 17, 402 40 C.F.R. § 6.302(h) State: C.R.S. §§ 33-2-101, et seq.	Requires that federal agencies insure that any action authorized, funded, or carried out by the agency is not likely to jeopardize the continued existence of any threatened or endangered species or destroy or adversely modify critical habitat.	Applicable	A survey of threatened and endangered species is underway. Prior to any action that would jeopardize the continued existence of any threatened or endangered species or destroy or adversely modify critical habitat, appropriate State and Federal agencies will be consulted. See section 5.3.
Coastal Zone Management Act	16 U.S.C. §§ 1451-1464	Prohibits federal agencies from undertaking any activity that is not consistent with a state's approved coastal zone management program.	No	The site is not in the vicinity of a coastal zone.

Table 7 (continued)
Potential Action Specific ARARs

Potentially Applicable or Relevant and Appropriate	Citation	Description	Potentially Applicable or Relevant and Appropriate	Comment
Wild and Scenic Rivers Act	16 U.S.C. §§ 1271-1287 40 C.F.R. § 6.302(e) 36 C.F.R. Part 297	Establishes requirements applicable to water resource development projects affecting wild, scenic, or recreational rivers within or studied for inclusion in the National Wild and Scenic Rivers System.	Applicable	The site is not a wild, scenic, or recreational river in the National Wild and Scenic River Systems. It will be determined if any part of the site is included in the inventory of rivers under consideration.
Executive Order on Protection of Wetlands	Exec. Order No. 11, 990 40 C.F.R. § 6.302(b) and Appendix A	Requires federal agencies to evaluate the potential effects of actions they may take in wetlands to minimize adverse impacts to the wetlands.	Applicable	Wetlands will be inventoried and considered.
Executive Order on Floodplain Management Management	Exec. Order No. 11,988 40 C.F.R. § 6.302(b) and Appendix A	Requires federal agencies to evaluate the potential effects of actions they may take in a floodplain to avoid, to the maximum, extent possible, the adverse impacts associated with direct and indirect development of a floodplain.	Applicable	Floodplains potentially impacted will be inventoried and considered.
Rivers and Harbors Act of 1899, Section 10 Permit	33 U.S.C. § 403 33 C.F.R. Pads 320-330	Requires permit for structures or work in or affecting navigable waters.	No	Surface water on the Summitville Mine Site are not navigable within the meaning of Section 10 of the Rivers and Harbors Act of 1899.

Table 8

Numeric Surface Water Quality Goals and ARARs
Alamosa River - Monitoring Station AR-45.4

METAL	SURFACE WATER QUALITY GOALS Class 1 (TVS)
pH	6.5-9.0
Aluminum, chronic	87ug/l dissolved, May 1 through September 30 only. For a balance of year Chronic = Acute TVs = 750ug/l dissolved
Arsenic, acute	50ug/l, total recoverable, 1-day
Cadmium, chronic	2.3ug/l dissolved @ 250 mg/1 hardness
Chrome VI, chronic	11 ug/l dissolved
Copper, chronic	30ug/l dissolved, based upon 85th percentile ambient data from segment 3a
Cyanide	5ug/l, 1-day
Iron, chronic	12,000ug/l, total recoverable, based upon 85th percentile ambient data
Lead, chronic	14ug/l dissolved @ 250mg/l hardness
Manganese, chronic	1000ug/l, dissolved
Mercury, chronic	0.0 ug/l, total recoverable
Nickel, chronic	192ug/l dissolved @ 250mg/l hardness
Silver, chronic, trout	0.36ug/l dissolved @ 250mg/l hardness
Zinc, chronic	230ug/l dissolved @ 250mg/l hardness

Note: Based upon WQCD finding of 250mg/l hardness. Reservoir.

Table 9

EVALUATION OF ALTERNATIVES

Criteria	Alternative No. 1 NO ACTION	Alternative No. 2 CONTINUE TREATMENT-NO AND CONVERSION	Alternative No. 3 CONTINUE TREATMENT-WITH AND CONVERSION	Alternative No. 4 CONTINUE TREATMENT-WITH AMD CONVERSION AND CONTAINMENT	Alternative No.5 CONTINUE TREATMENT-WITH NEW PLAN
Overall Protection of Human Health and the Environment	Does not provide any measure of protection	Protection of human health and the environment would continue at the current level.	Treatment of additional AMD improves overall protection of human health and the environment. Activation of the MRP preserves this protection during peak flows.	Containment of surface water assures the maximum possible protection for human health and the environment during interim remedial actions.	Containment of surface water assures the maximum possible protection during interim remedial actions.
Compliance with ARAR's	Does not meet ARARs.	It is anticipated that ARARs will be met after source control actions are complete.	it is anticipated that ARARs will be met after source control actions are Complete.	It is anticipated that this alternative meets ARARs.	It is anticipated that this alternative meets ARARs.
Long-term effectiveness and permanence	None	Properly designed disposal area can provide adequate containment of residual sludges including capping as final action to prevent remobilization.	Properly designed disposal area can provide adequate containment of residual sludges including capping as final action to prevent remobilization.	Effects of Interim remedial measures in reducing containment lead in downstream waters is unknown.	Effects of Interim remedial measures in reducing containment lead in downstream waters is unknown.
Reduction of toxicity, mobility, or volume	No reduction of toxicity, mobility, or volume	Transported contaminant volume is reduced. Metals mobility in residual materials is low. This Alternative is not effective at reducing total contaminant toxicity, mobility, or volume.	Transported contaminant volume is reduced. Metals mobility in residual materials is low. Peak flow in excess of 1000 GPM would discharge into Wightman Fork.	This alternative encompasses treatment of all contaminated point source discharges.	This alternative encompasses treatment of all contaminated point source discharges.

Table 9 (CONTINUED)

EVALUATION OF ALTERNATIVES

Criteria	Alternative No. 1 NO ACTION	Alternative No. 2 CONTINUE TREATMENT-NO AMD CONVERSION	Alternative No. 3 CONTINUE TREATMENT-WITH AMD CONVERSION	Alternative No.4 CONTINUE TREATMENT-WITH AMD CONVERSION AND CONTAINMENT	Alternative No. 5 CONTINUE TREATMENT-WITH NEW PLAN
Short-term effectiveness	None	No significant additional impact to human health or the environment during the short term.	No significant additional impact to human health or the environment during the short term.	Short-term benefit of this alternative is containment and treatment of all point sources of AMD-metals removed would not degrade downstream waters.	Short-term benefit of this alternative is containment and treatment of all point sources of AMD-metals removed would not degrade downstream waters.
Implementability	Shut-down and mothballing of the Site required periodic assessment and inspection required.	Easily implemented because all the required facilities are currently in use.	All materials and services required are available on Site. Conversion of CDP and MRP to treat AMD is required.	Implementation involves only on-Site activities. Materials and services exist or are available.	This alternative is implementable. Construction of new AMD treatment plant required.
Cost Capital	$892,300	$9,936,900	$9,795,500	$9,785,500	$15,024,500
Capital Cost\ Construction				$1,610,000	
Treatment and Assessment (1995-1996)	$55,600	$55,600	$9,488,500	$8,724,100	$5,834,500
Present Worth of Annual Treatment and Assessment	$240,900	$187,900	$24,411,700	$15,469,200	$17,136,700
Total Capital and Present Value Treatment and Assessment	$1,133,200	$10,123,800	$32,207,200	$26,874,700	$32,161,200

Table 10

Cost Estimate for Alternative #1

Cost Estimate Spreadsheet

Cost Basis: Dismantle, Mothball and Shutdown of all three water treatment plants CDP, MILP and CWTP.
Weekly Treatment and Assessment of Compliance Point AK 45.4

Total Capital Costs

Demobilization Costs	Unit	Number	Unit Cost	Cost
Shutdown of CDP and Pumphouse (4 weeks)	LS	1	$208,578	$208,576
Shutdown of MRP (3 weeks)	LS	1	$148,277	$148,277
Shutdown of CWTP (2 weeks)	LS	1	$55,606	$56,606
Vehicles Demobilization	LS	1	$25,000	$25,000
ICP Demobilization	LS	1	$6,000	$6,000
Stationary Filter Press - Demob	LS	1	$25,000	$25,000
Mobile Filter Press - Demob	LS	1	$6,000	$6,000
Site Support (4 weeks)	LS	1	$416,838	$416,838
			Subtotal	$892.297

TOTAL Treatment and Assessment COSTS

Weekly Treatment and Assessment of AR - 45.4	Unit	Number	Unit Cost	Cost
Technicians	Hours	416	$40	$16,640
Laboratory Analyses	Each	260	$150	$39,000
			Subtotal	$55,640
Present Value (@ 5% for 5 years)				$240,892
Total Present Value Cost (Treatment and Assessment)				$1,133,189

Table 11

Cost Estimate for Alternative #2

Cost Estimate Spreadsheet

Cost Basis: Treat HLP Leachate and drain Heap by August 1995
Discharge, mothball and shutdown CDP and MRP
Treatment and Assessment of compliance point AR 45.4 weekly
September 1995 for four years.

Total Capital Costs

	Unit	Number	Unit Cost	Cost
HLP Leachate Treatment	1000 Gal.	170,000	$32.18	$5,470,600
Shutdown of CDP and Pumphouse (4 weeks)	LS	1	$208,576	$206,576
Shutdown of MRP (3 weeks)	LS	1	$148,277	$148,277
Vehicles Demobilization	LS	1	$10,000	$10,000
Site Support (51 weeks)	LS	1	$80,362	$4,098,462
		Subtotal		$9,935,915

Total Treatment and Assessment Costs

Weekly Treatment and Assessment of AR - 45-4. from 1995 onwards

	Unit	Number	Unit cost	Cost
Technicians	Hours	416	$40	$16,640
Laboratory Analyses	Each	260	$150	$39,000
		Subtotal		$55,640
Present Value (@ 5% for 4 years, 1995-1999)				$187,902
Total Present Value Cost (Treatment and Assessment)				$10,123,817

Table 12

Cost Estimate for Alternative #3

Cost Estimate Spread Sheet

Cost Basis: Treat HLP Leachate and drain Heap by August 1995
Treat with CDP and Mothball MRP for seasonal use
MRP Treatment only May through July
Lower Flows from 1996 onwards

Total Capital Costs

	Unit	Number	Unit Cost	Cost
HLP Leachate Treatment	1000 Gal.	170,000	$32.18	$5,470,600
Site Support (51 weeks)	Week	51	$80,362	$4,098,462
Shutdown Pumphouse (1 week)	LS	1	$52,144	$52,14.4
Shutdown of MRP (3 weeks)	LS	1	$148,277	$148,277
Reroute CDP Effluent to Wightman Fork	LS	1	$21,000	$21,000
Vehicles Demobilization	LS	1	$5,000	$5,000
			Subtotal	$9,795,483

Total Treatment and Assessment Costs

	Unit	Number	Unit Cost	Cost
CDP Operation @500 GPM				
MRP Operation during May, June and July				
1995-96				
CDP Treatment cost per week	Week	52	$108,562	$5,645,224
Site Support	Week	52	$63,056	$3,278,912
Startup/Shutdown of MRP	Week	2	$37,621	$75,242
Treatment Cost per Week	Week	13	$37,621	$489,073
			Total Year 2	$9,488,451
1996-90 (Cost per year)				
CDP Treatment cost per week	Week	52	$79,934	$4,156,568
Site Support	Week	52	$32,267	$1,677,884
Startup/Shutdown of MRP	Week	2	$37,621	$75,242
Treatment Cost per Week	Week	13	$37,621	$489,073
			Total Year 3/4/5	$6,398,767

Net Present Value (@% for 4 years, 1995-1999) $24,411,683

Total Present Value Cost (Treatment and Assessment) $32,207,166

Table 13

Cost Estimate for Alternative #4

Cost Estimate Spreadsheet

Cost Basis: Treat HLP Leachate and drain Heap by August 1995
Treat with CDP and Shutdown MRP
Construct or Create Storage Capacity
Reduced Operation after 1996

Total Capital Costs

	Unit	Number	Unit Cost	Cost
HLP Leachate Treatment (48 weeks)	1000 Gal.	170,000	$32.18	$5,470,600
Site Support (51 weeks)	Week	51	$80,362	$4,098,462
Shutdown Pumphouse	LS	1	$148,277	$148,277
Reroute CDP Effluent to Wightman Fork	LS	1	$52,144	$52,144
Vehicles Demobilization	LS	1	$5,000	$5,000
			Subtotal	$9,798,483

Total Treatment and Assessment Costs

	Unit	Number	Unit Cost	Cost
CDP Operation @ 500 GPM				
1995-96				
Treatment cost per week	Week	52	$108,562	$5,645,224
Site Support	Week	52	$63,056	$3,278,912
			Total Year 1	$8,924,136
1996-97				
Treatment cost per week	Week	35	$79,934	$2,797,690
Site Support	Week	35	$32,267	$1,129,345
			Total Year 2	$3,927,035
1997-98				
Treatment cost per week	Week	26	$79,934	$2,078,284
Site Support	Week	26	$32,267	$2,917,226
			Total Year 3	$2,917,226
1998-99				
Treatment cost per week	Week	18	$79,934	$1,438,812
Site Support	Week	18	$32,267	$580,806
			Total Year 4	$2,019,618
Net Present Worth (@ 5% 1995-99 Treatment and Assessment Costs)				
Subtotal Present Worth Cost (Treatment and Assessment + Capital)				
STORAGE CONSTRUCTION				$25,614,691
Constructed Storage at CC\BMD	LS	1	$1,610,000	$1,610.000
Total Present Worth Cost (Treatment and Assessment + Capital)				$26,524,691

Table 14

Cost Estimate for Alternative #5

Cost Estimate Spreadsheet

Cost Basis: Treat HLP Leachate and drain Heap by August 1995
Shutdown CDP, MRP and
Construct a New Water Treatment Plant
Plant size to treat all AMD Sources

Total Capital Costs

	Unit	Number	Unit Cost	Cost
HLP Leachate Treatment	1000 Gal.	170,000	$32.18	$5,470,600
Site Support (51 weeks)	Week	51	$80,362	$4,098,462
Shutdown CDP and Pumphouse (4 weeks)	LS	1	$208,576	$208,576
Shutdown MR (3 weeks)	LS	1	$148,277	$148,277
Shutdown CWTP (2 weeks)	LS	1	$56,606	$56,606
ICP Demobilization	LS	1	$6,000	$6,000
Stationary Filter - Demob	LS	1	$25,000	$25,000
Mobile Filter Pros - Dennob	LS	1	$6,000	$6,000
Vehicles Demobilization	LS	1	$5,000	$5,000
CONSTRUCT NEW WATER TREATMENT PLANT ($3.5 TO 5.0 MILLION)				
Construction Costs	LS	1	$5,000,000	$5,000,000
			Subtotal	$15,024,521

Total Treatment and Assessment Costs

	Unit	Number	Unit Cost	Cost
New Treatment Plant Operation Year Around				
Plant Treatment Rate: High During Spring Runoff, Low in Winter				
1995-96				
Treatment cost per week	Week	52	$79,934	$4,156,568
Site Support	Week	52	$32,267	$1,677,884
			Total Year 1	$5,834,452
1996-99 (Cost per year)				
Treatment cost per week	Week	52	$59,950	$3,117,400
Site Support	Week	52	$32,267	$1,677,884
			Total Year 2\3\4	$4,795,284

Net Present Value (@5% for 4 years, 1995-1999) $17,136,689

Total Present Value Cost (Treatment and Assessment) $32,161,210

<IMG SRC 0895095B>
<IMG SRC 0895095C>
<IMG SRC 0895095D>
<IMG SRC 0895095E>
<IMG SRC 0895095F>